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AMERICAN MACHINIST

A JOURNAL FOR MACHINISTS, ENGINEERS, FOUNDERS, BOILER MAKERS, PATTERN MAKERS AND BLACKSMITHS.

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Independent Air and Circulating Pumping Engine—Compound System for the U. S. Battle-ship "Maine."

In our issue of November 27, 1890, in an article descriptive of the launching of the battle-ship "Maine," we mentioned the fact that this vessel was to be supplied with an entire outfit of steam pumps of the "Blake" type, including the independent air and circulating pumps for the main engines of the vessel. In this number we give an engraving and further particulars concerning these improved auxiliaries.

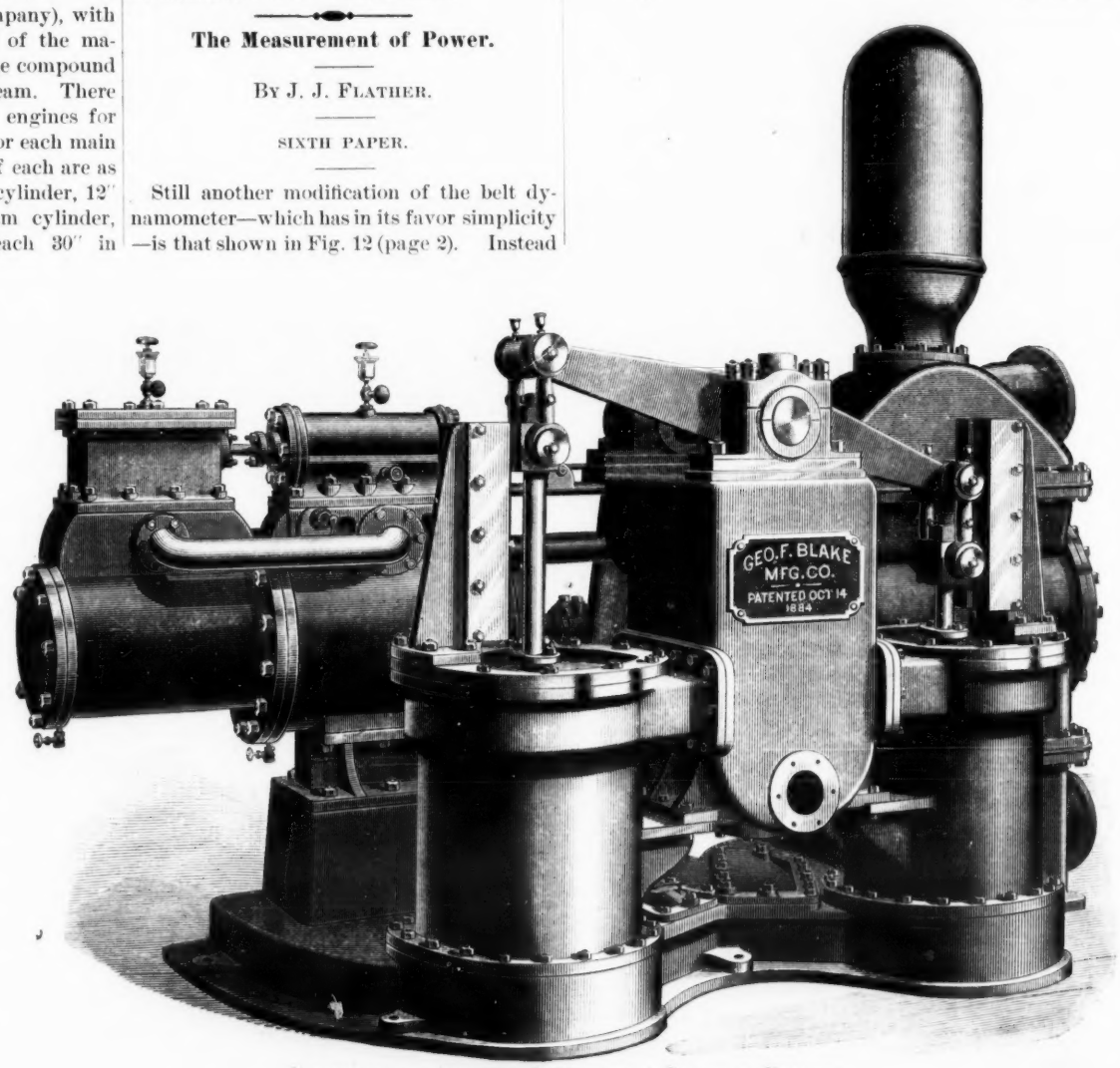
The general design of this combined air and circulating pumping engine is similar to that now in use on the United States cruisers "Chicago" and "Dolphin" (which were also furnished by the same company), with the exception of the steam end of the machine, which is arranged on the compound system in order to economize steam. There will be two of these pumping engines for the battle-ship "Maine" (one for each main engine), and the dimensions of each are as follows: High-pressure steam cylinder, 12″ in diameter; low-pressure steam cylinder, 24″ in diameter; air-pumps, each 30″ in diameter; circulating water pump, 31″ in diameter; the length of stroke is less than 2 feet, owing to the limited space that could be given for floor space.

As will be seen by the engraving, the air-pumps are of the single-acting vertical type, worked by a beam, which is operated by means of the rock-shaft from the direct-acting pumping engine. The water cylinder is of the ordinary double-acting horizontal type, but has an unusually large amount of valve area, so as to admit of high piston speed, the object being to reduce weight and space to a minimum, and yet secure large pumping capacity. The high and low-pressure steam cylinders are operated by the "Blake" valve gear, which is adjustable while the pump is in operation, and is perfectly positive at any and all speeds. The adaptability of the direct-acting engine to the varying and uncertain load of an air pump makes this system very satisfactory. The pumps on the "Chicago," "Dolphin," "Boston" and Atlanta" (also those of the same type on the "Concord") have given entire satisfaction.

The air buckets of this machine are of special construction, which avoids any possibility of air pockets, and at the same time drains the channel way very effectively of water, so as to assist the free flow of vapors. The air and pump cylinders are made entirely of gun-metal composition, to comply with the Government specifications. This secures great durability and light weight. The water cylinder is provided with a by-pass valve (not shown), so that the amount of circulating water can be regulated according to its temperature, which, of course, varies with the seasons of the year and other conditions.

The capacity of these independent air and circulating pumping engines is for 4,000 I. H. P. each, which is the maximum estimated power of each of the triple-expansion engines of the battle-ship "Maine."

It is announced that Mrs. Bloomfield Moore, a very wealthy woman who has been, to quote the vernacular, "blowing in" a good deal of money to help Keely along with his "sympathetic vibration" scheme, has withdrawn, and it now again becomes a question as to where Keely is to get the necessary funds to pay for the "perfect machine" which he announced some time since was all he lacked to make his motor mote.



INDEPENDENT AIR AND CIRCULATING PUMPING ENGINE.

The Measurement of Power.

BY J. J. FLATHER.

SIXTH PAPER.

Still another modification of the belt dynamometer—which has in its favor simplicity—is that shown in Fig. 12 (page 2). Instead of employing a scale beam with movable weights, the force is measured by difference in actual weight of the machine when at rest and when in motion—the driving side of the belt being on the lower idle pulley. In this case the dynamometer is placed upon an ordinary platform scale, and the base filled with iron or other suitable material which will outweigh the pull of the belt. This is weighed (after the belt is put on ready for running), and when work is performed the resistance of the driven shaft tends to straighten out the belt, and thus to lift the weight in the base, so that, if weighed when the maximum resistance is reached, the difference in weight will equal W. As before, the driving force is equal to $P = T_1 - T_2$ the difference in tension between the tight and slack sides of the belt.

From an inspection of the accompanying diagram, Fig. 13, it will be seen that as the pulley B is free to move up and down, the angle B will be less the greater the tension in T_1, for the greater the tension in T_1 the less (proportionally) there will be in T, and, in consequence, the weight of B and the slide to which B is attached will drop. As the tension in T_2 is equal to the weight acting at A divided by twice the cosine of the angle which it makes with the vertical, or, in the present case, with $\frac{\alpha}{2}$ we have $T_1 = \frac{W}{2 \cos \frac{\alpha}{2}}$. If $\frac{\beta}{2}$ equal the angle which T_2 makes with the vertical, we have in like manner $T_2 = \frac{W}{2 \cos. \frac{\beta}{2}}$ where W equals the weight of the slide, and is constant. The weight W acting at A is the difference in weight of the machine when at rest, and when work is performed. The angles α and B are variable, their magnitude depending upon the load passing through the belts.

For small machines which could be mounted on skids or other supports, and placed on a pair of platform scales, it would seem that the driving power could be obtained directly from the difference in weight when at rest, and when performing work, provided the driving shaft be placed vertically over the driven shaft of the machine; in this case a dash-pot connected with scale beam would be an advantage in obtaining steadiness of readings. If the driving and driven pulleys were of the same diameter, the force P ($= T_1 - T_2$) would equal W; but if a difference existed, the angle which the belt makes with the vertical would have to be obtained, and P calculated; in average cases this angle α will be quite small, and the cos. α will approach unity; therefore P will approach W.

In the experiments of Hartig a dynamometer was used, in which, by means of a series of gears, the rotating force is made to act upon a pair of springs, one of which is furnished with a pencil which describes a curve as a roll of paper is caused to move before it. The principle of action will be understood from the following, which is abstracted from Weisbach's Mechanics. To the interior of the wheel C A, Fig. 14, upon which the rotating force P acts at A, is bolted an annular gear which engages at D and D_1 with two equal gears D E and D_1 E_1, both of which act upon a third gear E E_1. This last gear revolves freely upon the shaft C of the wheel D D_1, and is firmly attached to the drum B C upon which the resistance Q acts, while the other two gears D E and D_1 E_1 have their axes supported by a lever F C F_1, which revolves freely about C. On the hub of this lever is a band wheel which carries a band, one end of which is fastened to the dynamometer springs H H, which latter is bolted down at M. We see that here the rotating force P is held in equilibrium by two forces R, $-R$, that out of these last arises a couple—R, R, which holds the force of resistance Q in equilibrium, and that, therefore, the forces 2 R and -2 R act at F and F_1, and stretch the springs H H with a certain force Z.

Let a = lever arm C A of the force P,

Let b = lever arm C B of the resistance Q,

Let r = radius C D of large annular gear,

Let r_1 = radius C E of center gear wheel, and hence $\frac{r - r_1}{2}$ = radius F D of intermediate gear,

C = lever arm of the force Z = C L, then we will have,

$$P a - R r = R r \text{ or } P a = 2 R r,$$

also,

$$Q b = 2 R r_1 : Z c - Q b = P a;$$

substituting above values for $Q b$ and $P a$ we have

$$Z c = 2 R (r + r_1);$$

hence

$$\frac{P a}{Q b} = \frac{2 R r}{2 R r_1}, \text{ or } \frac{P}{Q} = \frac{b}{a} \times \frac{r}{r_1},$$

and

$$\frac{P a}{Z c} = \frac{2 R r}{2 R (r + r_1)} \text{ or, } \frac{P}{Z} = \frac{C}{a} \times \frac{r}{r + r_1}$$

Among other forms of dynamometers not

already discussed is the Emerson power scale—an instrument which is connected directly to the revolving shaft without the interposition of belts, except that used to drive the shaft itself. This dynamometer is largely used in cotton mills to determine the power consumed by the individual machines, and when used with care forms an excellent instrument for the purpose, being self-contained and readily applied. In this machine, Fig. 15, the pulley which receives the power is loose on the shaft, and is connected with the latter by means of a spider, which is keyed to the shaft, the hub of the spider forming one of the guides to the position of the pulley not shown in the figure; to connect this spider with the loose pulley, a bell-crank lever is pivoted into lugs on the rim of the wheel on opposite sides, the long arm of which connects with an annular slotted collar on the shaft by means of short links.

The short arms of the crank levers connect on the inside of the fixed wheel with two radial links, one parallel to the outer arm of the bell crank, and the other at right angles to it, receiving at its upper end a pivot passing through a swivel hung to the arm of the spider wheel, and having its extreme end pivoted to a stud fixed on the inner side of the rim of the receiving pulley. The strain of the power received through the belt on the pulley will necessarily react on the levers, and, through them, on the spider, which may be considered as a support to these levers in sustaining them in position to connect the loose receiving pulley with the shaft. The levers are connected by pivots with the sliding collar, in the annular groove of which is seated a strap with which is connected a forked lever. Attached to the end of the long arm of this lever is a rod carrying movable weights; connected with this rod is a chain which runs over the cylindrical head of a pendulum weight having a pointer which traverses a fixed quadrant; this quadrant being divided by a scale to denote the relative pressure exerted through the medium of the receiving pulley on the shaft. A dash-pot is connected to the long lever and chain rod to prevent unnecessary oscillations of the pendulum.

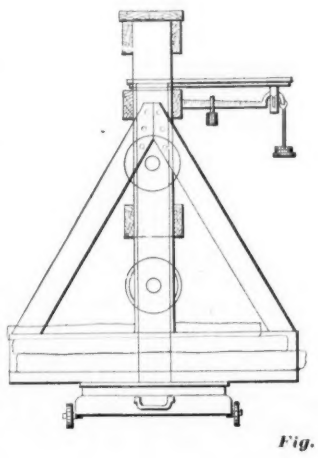
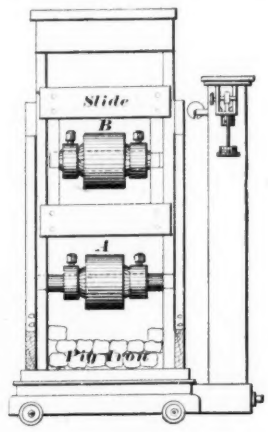


Fig. 12.



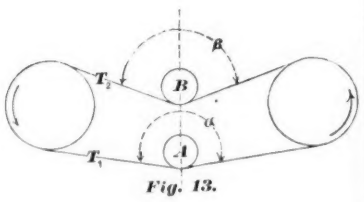


Fig. 13.

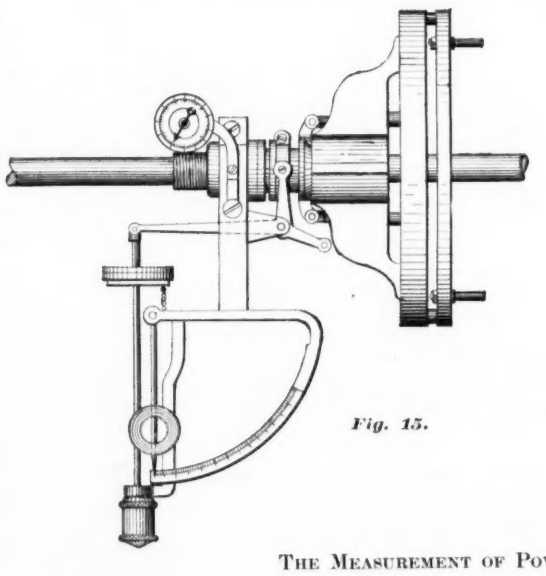


Fig. 15.

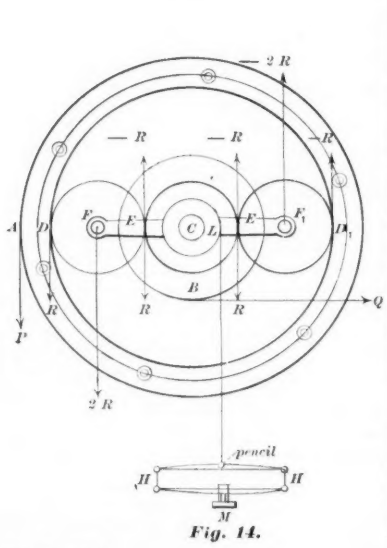


Fig. 14.

THE MEASUREMENT OF POWER.—SEE PAGE 1.

Kinks for the Shop—Designing Special Tools.

BY FRED H. COLVIN.

While on a recent trip through Yankeeland, I was in a shop where a friend works, and he showed me a couple of kinks he had, and as "kinks" are legal tender in the AMERICAN MACHINIST, I will give them to your readers if you want them. Much of this friend's work is on frictional machinery, and belting is the frictional surface used—and as rivets are a kind of necessary evil in fastening the belt to the pulleys, the less there are of them above board the better.

Some use a regular carpenter's S countersink, and some—the majority—use a jackknife, and haggle it out some way; but this isn't the way he does it.

He forged a knife, as shown in Fig. 1, and now scoops out just the required amount every time—the depth can be varied to suit, and it might help things to have a small tit on the end that just filled a common size rivet hole. It's these little kinks that help us along in our daily work.

Amongst his work is also some woolen machinery that has a narrow belt with hooks or staples for feeders for the wool.

When he first took this job they used a hand-punch like Fig. 2, having three teeth, as shown, unevenly spaced, the staples being about half-inch prongs, and being spaced about three-quarters of an inch apart. It will be readily seen that, by placing the odd tooth in the last hole, the other two holes are spaced off the right distance ahead. Slow and sure—slow enough for any one, and sure enough, too, when the punch didn't slip. But it didn't suit the progressive mechanic, and, knowing that it would save his employer much time (and that means money), he devised another rig.

Finding a cast-iron wheel, about eight inches in diameter, he calculated the periphery so as to "come out even" with the oddly spaced teeth, and drilled it for the teeth at odd times when he had a chance, without interfering with the regular work—a man can often find such time if he tries. It was a short job to mount it on a stand and attach a crank, and, after fixing a guide for the belt at the bottom, it was ready for business. On the first job it more than saved its cost, and has kept on saving time faster than a man can save money. Now comes the "interesting" part of it, which shows—well, let's see what it shows.

The boss saw it, and, on looking it over, said, "I thought of that years ago, but never got time to make one." He either lied, or else was a small-bored individual; for, if he thought of it, he hadn't brains enough to appreciate the saving, and, if he didn't—and that is most probable—he tried to steal the credit of another man's ingenuity; this, too, when it meant money in his pocket. It isn't much satisfaction for a workman to devise these little tools that help to get out work, and then have some one claim the whole thing as his old idea. A little credit and praise where it is deserved not only lightens the cares of the day for any man, but makes him feel as though he belonged to the same world as the boss does, and not three or four flights down.

Right here let me say that the employer who treats his men as men rarely has any trouble.

KINKS FOR THE SHOP.

Quite a digression, to be sure; but a "kink," nevertheless, and one worth thinking over. It happened that a support or standard was to be drilled and countersunk for wood screws, and, as it was of peculiar shape, and must be drilled from the upper side, there was no drill of the size required that would reach; the length was seven inches. As it was in a hurry, and no time to make a flat drill, a large drill was procured, of sufficient size to make the counterbore, and the holes drilled with that, or rather counterbored before drilling.

The drill point, as shown in Fig. 3, about broke through, and it was an easy matter to use a hand reamer and ream the holes to size for the wood screws. A short job and an easy makeshift for what seemed at first a "sticker"—a modification of this may be of use to some of the readers.

There is a knack in designing anything, be it tool or other article, that in some people seems natural, while in others it is uphill work, but a few points may be of interest and help some one. I don't pretend to say to which class I belong; perhaps not either, but when there is any new tool that I want, this is an outline of the plan. You all know what the tool is to be used for, and can see some indefinite form (in your mind) that might answer—draw it.

Make a sketch of it, no matter how crude or how expensive the tool would be to make, draw it. It is much easier to eliminate superfluous or undesirable features when you see it in black and white, than when the outline exists only in the mind. You can pare down, alter different parts, and, in fact, see every detail, both of construction and usefulness, from a drawing, with comparative ease. Make sketches of it in the different stages, and it will do for an exhibition of the evolutionary principle. Drawing more than anything else (excepting, of course, the elementary branches,) is of help to the mechanic who wishes to progress; it is a manner of "thought writing" that many would give much to possess, and yet they could have, or could now possess it at the cost of a little patient study.

The *Mail and Express* reports Dr. Guzman, the Minister of Nicaragua at Washington, as saying, in relation to securing trade between this country and the Central American Republics:

The best and brainiest men in this country [United States] should be appointed as ministers to the Central American Republics. There are plenty of brainy men who are willing to represent Uncle Sam in those republics. It costs little or nothing to live at the capital of Nicaragua. A minister receiving a salary of $6,000 a year could save at least $3,000. There is every inducement in the world to have more ministers to the five republics than one.

This may be good advice, still it strikes us that, as long as the English and German manufacturers can afford to sell cheaper than our own manufacturers can, American ministers by the score cannot greatly affect trade. All the diplomacy in the world is not likely to induce people in Central America to pay two dollars to this country for one and one-half dollars worth of goods, as judged by the price for which they can get the same goods from England or Germany.

The well-known manager of a large works in this country where a material part of the outfit is boilers that must be of good quality, says that it is extremely difficult—in fact, he puts it stronger than that—to do as good boiler work here as is done in England. The reason for this, he says, is that in England boys go through a long apprenticeship and come out of it boiler makers. Here a boy works his way into a shop for about six months, then leaves and goes to work as a journeyman in another shop. With such men, he says, good boilers cannot be made.

There is building in England a dynamite gun of fifteen-inch bore, guaranteed to throw a shell containing 500 pounds of dynamite a distance of three miles. The barrel is of Whitworth forged steel, and the construction appears to be quite different from that of the Zalinski gun. The inventor of this gun is Lieutenant Graydon, of the United States Navy. It is believed that if this gun is successful much larger ones, with corresponding greater range, will be built.

A dispatch sent from Montreal to London, and a reply received, all in thirteen minutes, illustrates how business is conducted at the present time. Contrast this with the not-long-ago of sailing vessels as the quickest medium, and a fair idea of progress is had.

When the ship canals under construction and projected in England are completed, vessels will sail direct from the ports of the world to the center of England. This will very materially cheapen transportation, and should benefit the entire world.

It is said that 500,000,000 passengers were carried last year in vessels under United States inspection, out of which number only sixty-five lost their lives. This is according to the Secretary of the Treasury, and is certainly a remarkable showing.

Condition and Prospect of the Machinery Business.

LETTERS FROM PROMINENT ESTABLISHMENTS TO THE "AMERICAN MACHINIST."

The Berlin Iron Bridge Co. (Iron Bridges, Iron Roofs, Iron Buildings, Girders, Corrugated Iron, Fire-proof Doors and Shutters), East Berlin, Conn., write us:

During the past year we have done more business than any year in the history of our company, by fifty per cent. This increase has largely been on account of our iron building work, as the growing demand for this class of iron buildings for machine shops, rolling-mills, paper-mills, pulp-mills, electric light stations, and that class of buildings is largely on the increase, and as we have been making a specialty of this class of work our business has consequently increased. As to the future we are not certain. The result of the last election makes the tariff policy of the government at least subject to some uncertainty, and the severe scarcity of money at the present time must, of necessity, cause a pause in the very general prosperity. We already begin to feel the effects of this, for many large projects for which we were making plans have either been abandoned, or else parties are postponing action, waiting the results of tariff legislation and the outlook in financial matters. Altogether we have no reason to complain of the last year, as it has been the best in our history, and we can only say that, if the following year will be equally as good, we certainly shall not complain.

P. S.—We might add to this that one of the greatest causes of the increase of our iron building trade has been due to our advertisement in your paper (and some other papers). We have heretofore done our advertising largely by means of circulars, until this year, when we have gone into newspaper advertising more extensively, and we find that it is worth one thousand dollars as against one dollar.

Shipman Engine Company (Automatic Oil Burning Steam Engines), Boston, Mass., write us:

Referring to our business for the past year, we beg to say that it has been eminently satisfactory in most respects, and while the number of engines sold by us has been greater than any year heretofore, we have commenced building much larger sizes, namely, eight and twenty-two H. P. compound, and we would say in connection with compound engines, we have never before attempted to manufacture this class of engines, but from the number we sold since last April, when we shipped the first one manufactured by us, we feel confident that our business in this particular line will be greatly increased for next year. We have shipped two compound engines to California, have orders at the present time for one to Holyoke, Mass., and a number that are going West.

Our export business for the past year has not been up to its usual standard; but from the indications since the first of November, we feel confident that this next year will see this portion of our business doubled, if all the indications do not fail. We are at the present time shipping an engine for electric light purposes to India, and have one nearly ready for shipment to Australia.

Since the finding of oil in South America, which is being welled to a considerable extent there, we have opened an agency for that territory, and our agents confidently predict a large sale this next year. Our great trouble heretofore in this territory has been that the price of oil which was exported from the United States was so high that we could not compete with coal or wood-burning engines, particularly the latter. This having been overcome by their own production, we see no reason why our output in this direction should not be increased certainly one-half, and our advices from our other foreign agents are equally as satisfactory. Our factory has been running for the most part since January 1st on over-time, and orders have accumulated.

We wish to say in this connection a good word for the AMERICAN MACHINIST, whose columns we have used to a limited extent for the past year, and certainly shall renew our contract for '91.

Fossil Meal Company (Sole Importers of Wm. Berkefeld's Fossil Meal Composition), New York City, write us:

The volume of our business done in 1890, compared with that of former years, has by far exceeded our expectations. We have retained all our old customers, and succeeded in securing a great many new ones, among them some of the largest steel works in the States. Besides this, we have opened the eyes of many users of non-conducting materials and convinced them that some miserable imitations which are sold under the name of "Fossil Meal" can not be compared with our old reliable Wm. Berkefeld's Fossil Meal Composition. The prospects for next year are very favorable.

Mason Regulator Co. (Steam Regulating Specialties), Boston, Mass., write us:

During 1890 we have done a larger business then ever before in our history. Our business has increased mostly since last July. A large share of this business is due to railroads, and to the adoption of our air-brake regulators on several of the largest railroad systems in the country. Regarding the prospect for 1891. We do not see why there should not be a good business, as there are a large number of factories now building, and there are soon to be hundreds of steam plants put in all over the country.

Athol Machine Company (Iron Founders, and Manufacturers of Hardware Specialties, Meat Cutters, Vises, etc., Selling Agents for Standard Tool Company's Fine Tools), Athol, Mass., write us:

We note a steady increase during the past year, not only in the number of our orders, but in their size. Have added a new grinding-room to our works, whereby we are able to do more and better work, the machines being set in a cement floor, making them run with great steadiness. The care we have heretofore exercised that none but perfect tools should leave our works is beginning to tell, and we have the prospect of a largely increased trade in the immediate future.

Fitchburg Machine Works (Metal-working Machinery), Fitchburg, Mass., write us:

Replying to your favor of the 10th, will say, that the indications of good business which we spoke of one year ago have been fully realized, that is, if "good business" means plenty of work; we have been very busy all the time, and our product has only been limited by our capacity to do the work. We have added to our plant in the past year a large number of tools, both of our own manufacture, and special tools built by other manufacturers; we now have in our employ more men than ever before, but we have found it necessary to run considerable extra time in the past six months. The improvements made in our engine lathes have proved very satisfactory to our customers, and we have been very busy in our lathe department. We see no reason why business should not be as good for the year 1891 as for the year just closed.

Ferracute Machine Company (Presses, Dies and other Sheet Metal Tools, Light Machinery improved, cheapened and manufactured on the "Duplicate System"), Bridgeton, N. J., write us:

The volume of business during 1890 has been about the same as in 1889. We have made new patterns for a number of our punching presses, have improved them, and are building them in larger quantities, and they are fitted up better than heretofore. This line of trade has increased rapidly, and we are sending these presses to large shops in all parts of the country. They are especially adapted for hardware, locks, and for general cutting out of heavy sheet metal goods, and also for shearing and punching, etc. They are designed and built as first-class machine tools. We are also bringing out a line of double-action drawing presses embodying several novel features. The first of these is about finished, and other sizes will follow shortly. We have not added to our buildings nor increased our plant and tools to any great extent, but if we increase our capital, as we expect to soon, we shall add a number of heavy machines. Trade was very good up to July. It was then slack for two or three months, but we are now very busy with orders for some time ahead, and the prospects are good for next year, providing the financial depression does not continue. We have just issued a number of new illustrated lists describing our various kinds of machinery.

Montgomery & Company (Importers and Jobbers. Tools, Supplies and Machinery), New York City, write us:

The past year has been very good, the demand for small tools has been exceedingly brisk, our regular customers have bought largely, and many new ones have appeared. Our sales for the year have been much larger than any previous one, and would have been still larger had we been able to fill all orders.

We had a good many orders canceled owing to our inability to get goods from the different factories.

Our sales in small lathes have been very large; in fact, the demand for them has been unprecedented.

Last year when writing you we hoped for better prices; well, to a certain extent they have come, and, we believe, to stay.

Although money has been tight and collections very slow, things look to have changed for better, and it is our belief that 1891 will be as good, if not better, than our old friend '90.

A noticeable feature of our business during the past year was the increased quantities of tools that we sold in the Southern States, almost three times the quantity we sent there in '89.

Randolph Brandt (Manufacturer of the Selden Patent Packing—with and without Rubber Core—Mine, Mill and Steamship Supplies), New York City, writes us:

After the first three months of the year trade fell off sharply for April, May, and the first half of June, and prospects were anything but cheerful; thereafter there was a marked improvement, and the summer and fall have shown the largest sales for those seasons which I have known, so that, while the totals for the year have not been made up, I have every reason to believe they will show a handsome increase over the previous year.

Arthur R. King (Foundry and Machine Works, Heavy and Light Castings in Iron, Brass and Composition, General Machine Work, Manufacturer of Special Machinery and Tools), Jersey City, N. J., writes us:

Our business for the past year has been very satisfactory indeed, the foundry department growing steadily in amount of output, and being fully up to our most sanguine expectations. The machine department has also been pushed to its full capacity in manufacturing our line of boiler maker's tools and other specialties, as well as general machine work. We propose to incorporate by the first of the new year, and expect to increase our present facilities in order to place on the market some new tools. On the whole, we have been fully favored with our share of the general prosperity, and the prospects for the coming year seem very favorable.

Betts Machine Company (Makers of Metal-working Machine Tools for Railway, Bridge and Machine Shops and Iron Works generally), Wilmington, Del., write us:

The year just closing has been a very busy one with us, and the prospects are that next year will be equally as good.

The Fox Machine Company (Wood and Iron-working Machinery, Universal Mitering Machine, the Fox Patent Universal Trimmer, the Fox Patent Universal Dado Head), Grand Rapids, Mich., write us:

Our business has about doubled in the past year. We have brought out several new tools in the universal trimmer, mitering machine and dado saw departments. Besides reducing the price on our specialties, we have improved the quality; have also added to our line a few large special machines for working wood.

On account of the larger class of work we have taken up, we have been obliged to put in larger tools, among which we might mention a Detrick & Harvey open-side planer.

Owing to the difficulty we experienced in securing good knives in sufficient quantities to meet the demands of our growing business, we have been compelled to erect buildings fully equipped with special machinery for forging, tempering and grinding our knives.

We might give you a better idea of the growth of our business by stating that we begun the manufacture of our specialties in 1885, with two men, and we are now employing over forty.

Beside the manufacture of our specialties, we are doing a large commission business in both wood and iron-working machinery; have some large orders for 1891 delivery, and anticipate an increase over the year's output.

Charles A. Strelinger & Co. (Hardware, Tools and Supplies, Machinery), Detroit, Mich., write us:

Our trade during the past year has been exceptionally good. Our business shows an increase of from 33⅓ to 50 per cent. per month over the corresponding months last year. We have every reason to hope for a good trade during the coming year. We are at present engaged in preparing a new catalogue of tools, supplies and machinery used by metal workers, which we hope to issue during the coming year.

The Lexington Gear Works, Lexington, Mass., write us:

Our business for 1890 has been good, and it shows the usual yearly improvement. We have brought out no novelties or new branches, but we have made a decided improvement in our trade in cut-iron ready-made list gears. The cut gear will take the place of the rough cast gear as soon as the public is educated to the fact that they are really the cheapest, although their first cost is the greatest.

New Doty Manufacturing Company (Hand and Belt-power Punching and Shearing Machines), Janesville, Wis., write us:

Our business during 1890 has been larger in volume than during any previous year since the organization of our company.

During the year we have added several new machines to our plant, and are now better able to keep up with our orders. This is our dull season, and we do not expect business to pick up much before February. Wages are about the same as a year ago. We have recently shipped some of our goods to England, and one customer writes us that he and his friends are highly pleased with them, and that we can expect more orders from them.

We receive many inquiries from customers who state that they saw our ad. in your paper, and we are convinced that the ad. pays us well.

Cooke & Co. (Machinery and Supplies for Manufacturers, Mills, Mines, Railway and Steamship Companies), New York, write us:

Our general business for the year 1890 has been fully up to the previous year, and in our specialties we have done more business than ever before. There has been some slacking up of orders for a month past, probably owing to the general uncertainty regarding money matters. While we do not profess to be prophets, it seems to us there has been very little, if any, inflation of values during the past year or two, and that, consequently, there cannot be any general collapse. Business may be slow during the first two or three months of the coming year, but we shall be much disappointed if it is not humming along as lively as ever by next summer.

William Tod & Co. (Engineers, Founders and Machinists), Youngstown, Ohio, write us:

During the present year we have something more than doubled the size of our forge shop, increasing its equipment by a 3,200-pound hammer, crane and heating furnace. We have also added a new boiler and several machine tools. Our orders for the present year are 25 or 30 per cent. in excess of any previous year. The price of labor has advanced with us from 10 to 15 per cent. The prospects for 1891 appear, at present, to be good for a large amount of work, unless the present financial stringency should prove more lasting than we expect.

Landis Brothers (Tool Builders—Specialties—Universal and Plain Grinding Machines), Waynesboro, Pa., write us:

Our business, just recently started, has a promising outlook. We have supplied a number of our universal grinding machines, and have orders booked ahead. This machine has a number of new and important features, and it promises to have a demand. We contemplate shortly adding a few other new tools to our line, one of which is a bolt-threading head for bolt cutters, as well as complete bolt cutters. The new features of this head will be its capability of cutting from eight to ten times as many bolts with a single set of cutters as can be cut with the ordinary cutters used, and which will never need rehobbing and retempering, which will be a great saving in time and cost of cutters, and will produce uniform results. This head is so constructed that the cuttings can have no possible wearing effect upon it, and any wear would in no way affect the accuracy of the work done, after a long time in use. Another new tool is a drill chuck which embodies some new and advantageous features. It is self-tightening, universal, perfectly balanced, dirt-proof, and has a graded gripping power; that is, for a large drill it has a more powerful grip than for a small one, and does not need a wrench. The jaws are solidly backed for all sized drills, and do not project. Has no delicate parts, and can be taken apart by hand.

Maslin Machine Works, Engineers and Machinists (Maslin's Automatic Steam Vacuum Pump, Improved Vertical Engines, Boilers, Pulleys, Shafting, Hangers, etc., Maslin's Universal Emery Grinder, etc.), Jersey City, N. J., write us:

Business during the past year has been very satisfactory; in fact, somewhat beyond our expectations. On account of not having our large sizes of pump patterns, we have been compelled to refuse several orders. We now have under way patterns for several large sizes of pumps, one lot of which pumps are ordered and will be delivered for use in the spring. As to inquiries, we have no end.

S. W. Card & Co. (Taps and Dies), Mansfield, Mass., write us:

The past year has been a very busy one with us, and closes very satisfactorily. We think business prospects encouraging, and anticipate a good year's trade in 1891.

T. C. Dill Machine Co. (The Dill Improved Hook, Connecting Rods and Stub Ends for Valve Connections for Steam Engines), Philadelphia, Pa., write us:

We find our business at this time in much better condition than we did a year ago, and think our prospects for the future very encouraging, as we are now making arrangements for larger quarters, where we shall be able to handle our work to a better advantage.

Beaudry & Co. (Beaudry's Forging Presses, Duplex Presses, Shears and Punches, Power Hammers, etc.), Boston, write us:

For the past year press and hammer business has been good, and since last May we have been unable to supply the demand. At present we have large orders ahead, and there is every prospect of a brisk trade in our line the coming year. Important improvements in both hammers and presses have been made. We have contracted with The Lockwood Mfg. Co., of East Boston, to build our machines, which is a guarantee of first-class work in every detail.

The Gordon Steam Pump Co. (Duplex Steam Pumps, Water-works Pumping Machinery), Hamilton, Ohio, write us:

Our business for the year of 1890 has been far beyond any previous year in the history of our works. Our capacity has been taxed to its utmost. For the past six months we have been running 23 hours per day, and at the present time have about six months business ahead. The outlook for 1891 is exceedingly bright in our line. We have just closed the contract for a large addition to our present machine shops. With this completed we will about double our capacity. We have in the past year put in 21 water-works plants for city supply in the following States: New York, Ohio, Iowa, Wisconsin, Indiana, Minnesota, Kentucky, Michigan, Tennessee and Canada.

Acme Machinery Company (Bolt, Nut and Special Machinery), Cleveland, O., write us:

In reply to yours of the 10th inst., we are pleased to report that the past year has been a very busy one with us, the value of output being nearly 50 per cent. larger than in 1889. The outlook for 1891 just at present may not be as bright as may be desired, on account of the stringency of the money market; but orders seem to be coming in, if not quite so freely as before, still very satisfactorily, and enough to keep our regular force busy with what orders we carried over unfilled from the old year. We added during the past year quite a number of new machine tools, more than we did in any other one year before, finding it necessary to do so on account of the constantly increasing demand, not only for our well-known Acme bolt cutters, but also for our new improved bolt heading and forging machines, which we put on the market about a year ago. There has been no noticeable change in the price of material from a year ago, but good first-class mechanics command better pay.

Kempsmith Machine Tool Company (Iron and Brass Working Machinery), Milwaukee, Wis., write us:

Up to May last, we disposed of our product entirely through one house, and as our name was taken off all our machines, we had no identity in the business world, but since that date we have marketed our own machines, and have been able to sell all we could make, and at this writing have nothing in stock, and some orders booked for future delivery. We have done more business this year than last, and expect to increase our plant materially during the coming year.

We are constantly adding to our facilities, special tools, such as drill jigs, gauges, milling fixtures, and appliances that have a tendency to elevate the standard of the work, and we are striving to keep abreast the times, which are demanding stiffer, more powerful and longer-lived machines than ever before.

Jones & Lamson Machine Company (Screw Machines, Turret Lathes, Chucking Lathes and Brass Monitors, Roller Feed and Automatic Chuck, Second End Attachment, Chasing Apparatus, Taper Box Tool, Adjustable Hollow Mill, Clutch Holder for Dies, and small tools of all kinds), Springfield, Vt., write us:

The past year has been one of unprecedented prosperity with us, and we have more than doubled last year's sales. The whole twelve months have found us running on full time, and a great part of the year on over-time. A slight increase has been made in the number of our force, and the scarcity of good workmen who are out of employment has alone prevented a greater increase. In many cases we have lost orders by reason of our inability to make a quick delivery. The issue of our new illustrated fifty-six page catalogue created a great deal of interest, and the demand for it, aided by our advertisement in the AMERICAN MACHINIST, was greater than for any previous publication of this company.

We have just put on the market a new turret lathe that is entirely novel in design. It operates on a new scheme. It will turn true either long or short work. It will do it more rapidly than it has ever been done before. There are no projecting parts subject to strain. The overhang of turret tools and turret slide is eliminated altogether. All the thrusts of the cutting tools are therefore received directly by the ways of the lathe bed. All the operations of a screw machine, engine lathe and chucking lathe are done by this machine. It also mills and threads rough bolt forgings, no matter how much the head runs out. As for its capacity, it suffices to say that it will mill twenty-four inches in length and over two inches in diameter. The swing is sixteen inches.

In our other tools we have made many patented improvements. Additions to tools and fixtures have been for the most part in small tools, jigs, and special tools of all descriptions. We have greatly extended our market during the last year, and have made several large shipments to Europe.

With many orders ahead, and the general activity at present among manufacturers, we believe the coming year is to be a prosperous one to machine builders.

Frick Company, Engineers (Corliss Engines, Ice Making and Refrigerating Machinery), Waynesboro, Pa., write us:

Answering your circular letter of the 10th inst. asking about the condition of our business during 1890, and prospects for 1891, we have to say that the volume of business during the present year has been the largest in the history of the company. During this year we have enlarged our shops, and provided additional facilities, with the expectation of still increasing our business the coming year.

The business has been fairly prosperous, orders have accumulated, and the prospects for 1891 seem better than ever. There has been no material change in the price of labor, product or materials.

S. A. Smith (Manufacturers' Agent), Chicago, Ill., writes us:

The past year's trade in machinist tools has been unusually good, and held on well into December. Every concern that I represent report light stocks on hand, and nearly all have increased their facilities during the past year; but with all this activity prices rule very low. The outlook for spring trade is good. Light machinery is in active demand at the present time.

J. E. Snyder (successor to Currier & Snyder, Upright Drills), Worcester, Mass, writes us:

I have had a good business the entire year. I have orders on hand to last me for some time to come. I have added several lathes and planers the past year, and also more drills to my list. I believe when the money question is settled, and confidence restored, we will have a steady business for some time to come.

Brown & Sharpe Manufacturing Company (Machinery and Tools), Providence, R. I., write us:

Our sales for 1890 are considerably larger than in 1889. Commencing the year with 900 hands, we are now employing 1,000. The works have been increased by the construction of a fire-proof brick building 98 feet long, 51 feet wide, and three stories high, and by the addition of 81 machine tools. A foundation for an addition to main building, 154x51 feet, has also been put in.

Regarding the prospects for business for 1891, we would not wish to venture an opinion. Up to this time inquiries and orders are about the same as they have been for some months past.

The Billings & Spencer Co. (Machinists' Tools and Drop Forgings), Hartford, Conn., write us:

Our business for the past year has been all we anticipated. Our output has been about 25 per cent. more than that of the year 1889. To keep pace with the demand for our goods, we have been obliged to make extension to our forging department of 186x40 feet. The demand for our Billings' patent commutator bars, and copper, bronze, iron and steel drop forgings for dynamos and motors, and other electrical goods, shows conclusively that the electrical business has not yet reached its limit.

The demand for the 4" bicycle wrench during the past year has been very large, and from present indications it seems that we are destined to supply the riding fraternity with the standard cycle wrench of the country.

The Lodge & Davis Machine Tool Company (Iron and Brass-working Machinery), Cincinnati, Ohio, write us:

We are pleased to state that our business for the past year has been in every way more than satisfactory to us. Our sales have increased 40 per cent. over 1889. We are now employing over 500 machine hands in our own and our contractor's shops, and it is with pleasure that we are able to state that the demand for our product has justified us in paying as much, and in many cases more, for labor than during the preceding year. During the year we have added largely to our shop equipment in the line of special machines for turning out large amounts of duplicate work. This will be recognized as in line with the best theories of advanced shop practice. Our stores in New York and Chicago, owned and operated entirely by ourselves, have proved most valuable and profitable factors to our business. The tendency of the age is towards buying from first hands, as the consumer must in time realize the fact that he pays a commission when the article he requires is purchased for him. By dealing directly with his customer, the manufacturer comes more closely in touch with his wants and ideas.

The prospects for 1891, if the inquiries and orders for the past two months may be taken as a criterion, appear to be remarkably good. It may be a coincidence, and it may be more, but it is a fact that, as we have for the past five years steadily increased our advertisements in the AMERICAN MACHINIST, just as steadily has our business increased.

Darling, Brown & Sharpe (U. S. Standard Rules, Patent Hardened Cast-steel Try Squares, etc.), Providence, R. I., writes us:

The demand for our tools during 1890 has been in excess of that of the past year and trade bids fair to continue good.

Buffalo Forge Co. (Forges, Blowers, Exhausters, Punches, Shears and Drilling Machines, Patent Steam Hot Blast Heaters, Ventilating Wheels and Engines), Buffalo, N. Y., write us:

We are pleased to say that our anticipation as expressed in our last yearly letter, concerning the business outlook, namely, that our hot blast heating and ventilating branch would soon become a leading feature of our business, is being realized, perhaps sooner than expected. Our orders in this line have been very liberal indeed, so that we have been running our factory considerably over-time, and even now have an accumulation of orders for heating plants which will carry us considerably into the new year, with no new ones received.

The Buffalo hot blast apparatus has been materially improved, as shown in previous issues of the AMERICAN MACHINIST, so that now we are convinced that in points of durability and efficiency it is all that could be desired. The steady growth of this department has made the purchase of a large amount of improved machinery of latest design necessary. The building of special fans with high speed direct connected engines for use in ship ventilation and other special requirements is also a feature.

Our blacksmith line, including forges, drills, punches and shears, together with the power blower, shaving exhaust and ventilating fan departments have never shown up better, and several important improvements have been made in these various lines.

Notwithstanding the fact that this year started off with the capacity of our factory materially increased by additions, it is now being run to its fullest extent, and if our present anticipation for 1891, namely, that a most prosperous year in all manufacturing lines be realized, further additions or new buildings will be required to supply the trade for "Buffalo" goods.

B. W. Payne & Sons (Vertical and Horizontal, Automatic and Corliss Engines, Vertical and Stationary Steel Boilers, Condensing and Non-Condensing Compound Engines), Elmira, N. Y., write us:

We find a marked improvement in business over last year. At present we are doing all we can, but orders for future delivery are still accepted.

Trump Bros. Machine Co. (Light Machinery, Finished Hexagon Nuts, Stud, Coupling and Tap Bolts), Wilmington, Del., write us:

Our hopes, as expressed in our letter to you of December 11, 1889, have not been fully realized, as our total sales for '90 will show a decrease as compared with '89; however, at this time we are pleased to report that we are crowded full of work in every department, and that prospects for '91 are very encouraging—especially is this the case in our knitting-machine department.

Our sales of finished hexagon nuts *have been very satisfactory*, far exceeding those of any previous year. This we attribute to the fact that the average consumer is growing to appreciate the point that it pays to buy a *superior article, i. e., provided it is at no extra cost*; this is "where we come in" in the finished nut business. We have added a number of new tools, principally of our own design, and have materially increased our facilities for doing more and better work, but have not enlarged our buildings. We have taken hold of some *new* lines in the way of machinery, and hope to be in a position to make an encouraging account of same later on.

Wages are higher than in '89, also material. We are employing more hands than ever before, and are running full time.

We frequently hear from our advertisement in the AMERICAN MACHINIST, and attribute a considerable portion of our trade in nuts, chucks, center grinders, etc., to this medium.

G. S. Woolman (Mathematical and Optical Instruments), New York, writes us:

I presume the business of furnishing designers and draftsmen with materials may be taken as an index of general trade in civil and mechanical engineering; the greater the demand for "plans" the greater is the presumptive demand for the completed work.

Therefore it is with pleasure that I can say the demand for drawing materials for '90 has exceeded my expectations. This is shown especially in sales of paper, pencils, drawing pens, tracing cloth, etc., articles used every day in the drawing-room. This demand has of late been for quality rather than cheapness, and is, I think, an excellent sign, as it shows increased interest of the worker in his profession.

My sales of the "blue process" have been larger than ever, but the most pleasant of all is the demand for my Higgins' American drawing ink. This has now almost taken the place of the ancient India ink, and is undoubtedly a great triumph for American invention and enterprise. Sales for '90 are greater than for '89, and notwithstanding the present somewhat gloomy outlook in financial circles for '91, I look forward to a good trade in the coming year, and shall be much disappointed if it does not exceed the year just closed.

At any rate, we are now so busy with work that no time lies idle on our hands.

Worcester Machine Screw Company (Standard Machine Screws), Worcester, Mass., write us:

We have recently purchased the plant which we have occupied the past ten years, which comprises a brick building 250 feet long, two stories and basement, with wing 50x40, which is used for shipping-room and offices, engine and boiler-room outside of main building, and about 30,000 feet of land, 80 horse Corliss engine, and 100 horse boiler. We have erected since the first of September two new buildings, which consist of a brick storehouse, 80x25, two stories high, for coal and lumber, also room for making boxes, of which we use a great many in shipping our goods. Also brick building, 80x25, one-story high, which is used in part for stock-room, blacksmith's shop, and case-hardening furnaces. We have also put up a new chimney eighty-five feet high, three feet flue. Our business is good, and we have had a good year; in fact, the best we ever had. The prospects for a good business the coming year are very flattering, and we hope with the new improvements to be better able to take care of our rapidly-growing trade. There has been but a slight change in the price of labor and material from those of 1889. Iron has been a little higher, and labor fully up to the prices paid in 1889. There has been no change in the price of our goods, with the exception of round and flat head machine screws, which are lower to-day than ever before.

Chandler & Farquhar (Dealers in Machinists' Supplies and Hardware, Lathes, Drills and Shapers, Wood-working Machinery), Boston, Mass., write us:

We notice a decided increase in the volume of business at our machine tool store, which we opened some five years ago, and our regular retail small tool business has been about as usual, with a slight advance in prices on some goods of foreign make; on the whole, we feel quite satisfied with the year's trade, and shall expect large sales in machinery the next year, as the outlook is favorable.

[*Several letters stand over to appear next week.*]

LETTERS FROM PRACTICAL MEN.

Boring Tools.

Editor American Machinist:

The holders for boring tools illustrated in your Shop Notes, and by your correspondent "Davy," call to mind my experience with boring tools. To the latheman the boring and inside threading tools for general work are a source of considerable vexation. The tool-post or holder on a common lathe was not designed for holding boring tools, or, if it was, then it is a very poor thing for the purpose. Very few tool-posts have a slot high enough to allow of the center of the tool being raised to the height of the lathe center, and consequently all the boring tools must be forged so they will come up to the proper height. The boring tools that accumulate about a lathe have each been made for some job that the others were not suitable for, and if lathe hands are allowed a liberal supply of tools, their stock of boring tools will increase indefinitely, and yet not be universal enough to meet all jobs. Then there is the difficulty of holding the tool so it will not twist around in the tool-post and spring away from the work. To prevent this it is common to see a piece of iron set on end in the tool-block slot at the back end of the tool, and a wedge driven down between it and the tool; but this is only a poor makeshift.

The holder illustrated by "Davy" will do very well where the tool-post will allow it to be kept up to the center of the lathe, and the device, Fig. 3, in Shop Notes, is used to prevent it from twisting the tool-post around; but very many lathes have tool-posts which would not admit of its being raised to the proper height.

The Whitworth tool holder and the Lipe tool-post are the only ones I have yet seen that will hold a boring tool without additional devices.

All the foregoing difficulties I noted several years ago while running a lathe, and I designed a boring tool holder, which is shown in the drawing, but I have never had an opportunity to make one and use it, although I am sure it would be a desirable addition to a lathe, so I present it, with the hope that it may benefit some of your readers.

It is a casting fitted to the slot in place of the tool-post, and held in position by a bolt. The boring tool or boring tool holder may be a round or octagon bar, and is held in a V-shaped seat by set screws. The V seat is located so that it always brings the center of the bar or tool up to the height of the lathe center, no matter what sized bar is used; at the same time it brings the bar parallel to the center line.

It will be noted that there are bearing strips in the V seating at each end and the center, and the set-screws come inside the end strips. This is done to insure the bar a bearing at each end of the holder, and the screws are so located as to put an initial stress on the bar to prevent springing between its points of support while cutting. With a few bars of different sizes slotted for the insertion of small cutting tools, the lathe would be prepared for any boring job of that kind. It would be very easy to put on or remove, and would not be very expensive to make; in fact, would not cost near as much as to equip a lathe to do the same variety of work with the common kind of tools. In addition to this would be the satisfaction of getting the tool into proper location at once, and holding it so it could not possibly slip, and in consequence doing more work in the same time.

BELL CRANK.

Pivot Bearing for Vertical Shaft.

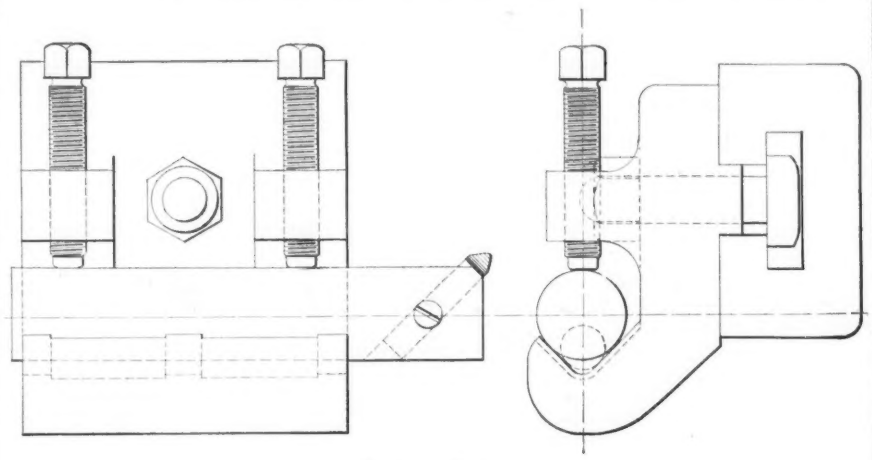
Editor American Machinist:

I desire to express my thanks to you for so kindly giving, in your issue of December 11th, in Answer 468, the information which I sought.

The fact is, I suppose that I ought to have known of your having published quite recently such an article on the curve of pivot bearings, but I had forgotten about it, but in this particular was no worse off than some of my associates who perhaps have more time to read this paper, or to digest it. I always try to find time to read it.

I have sent you a print of the pivot bearing which I have designed for the elevator to which I referred in my former letter, making application, as you will see, of the Schiele curve. This bearing carries about 3,000 pounds.

ARTHUR M. LANE,
Chief Draftsman S. L. W.



BORING TOOLS.

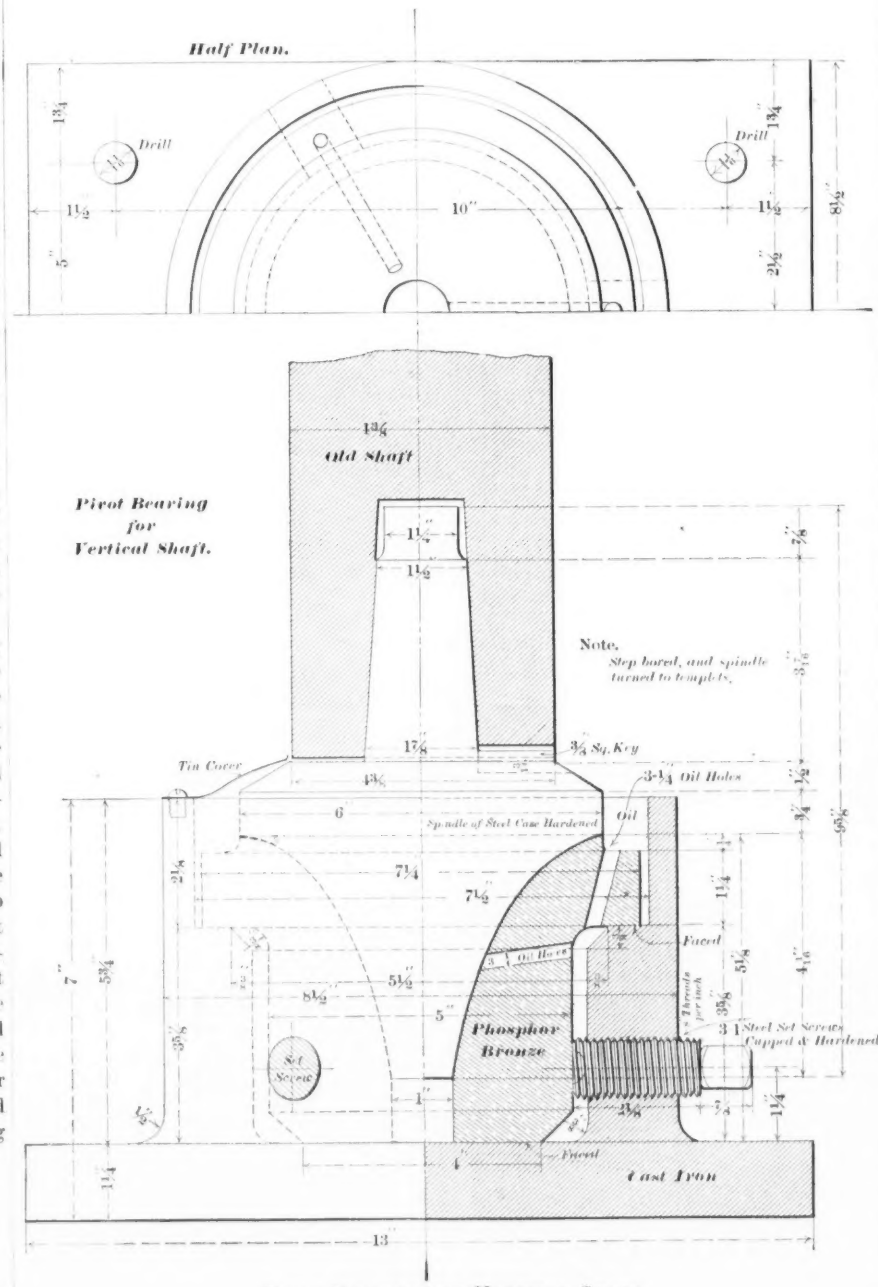
A Criticism of Foundry Economy.

Editor American Machinist:

I would like to say a few words in reply to an article on foundry economy by Mr. Thos. Wathey, in your issue of October 2d.

I think I would voice the sentiments of many foundrymen by saying there should be nothing but profound contempt for the idea of locking up nails or any other common material used in the foundry. If Mr. Wathey was compelled to work in a foundry where he would be required to go to the foreman for an order to get nails, flour, lead, mineral and charcoal dust, facing sand, new sand, etc., which are all often shamefully wasted, he would doubtless consider that the firm or his foreman had not much confidence in him, and he might wish some other method of preventing waste would be adopted.

Let us see who should be looked to for the various losses in the foundry. Foremen generally lay claim to the honor of commendable feats; who should own the failures? I have had experience in some of the best and some of the worst foundries in this country, and while in them I have noted the fitness of the foremen for the positions they held. Some would come into the shop and at a glance would see very nearly what every man was doing. If men were using facing sand wastefully, shoveling flour into the clay-wash, strewing nails in the marsh, banging wooden patterns with hammers or otherwise destroying things, they were promptly stopped. The men soon learned that any negligence on their part would soon be detected, and repetition not tolerated, so they just tried to do as near right as they knew how, and everything went along nicely. These foremen were what the word implies—the most capable men in the shop; men that knew what a day's work was, would insist on having a just day's work from every man, and would be satisfied when they got it.



PIVOT BEARING FOR VERTICAL SHAFT.

Others would rush into the shop apparently with more on their minds than an ordinary man could carry; some trivial affair had absorbed their whole thinking capacity. All around them waste would be going on, but they had so much to attend to, they couldn't see it, or their conception of the business was so slight they didn't know it was waste. One man might be sending out a casting with half a ton of sand sticking to it; others might be spreading flour over molds, or needlessly nailing the face of molds when proper ramming and venting would produce a far smoother casting. Another who had got a pattern which was not exactly a "flat-back," might have the carpenter for an hour or two tearing out old bars and putting in new when the old ones would answer all purposes with a few soldiers.

The core makers and dry sand molders might be using mixtures that were not suited to the purpose, with the result that nearly every casting had some defect. A scab, a blow, the core broke, the blacking washed, or the iron would not lay. They might be using a mixture of mineral, lehigh, lead, and charcoal for a first coat of blacking when there is an article in the market far cheaper, easier to slick, and equally as efficient.

All these shortcomings, and many more, can justly be laid to foremen who know so little of the business as to have no remedy for them.

Any foundry foreman who has not mechanical ability enough to design a foundry mill more economical than the one where Mr. Wathey saw the scrap is out of his sphere.

The foundry foreman that does not rattle in his position has no trouble about melting what scrap is made in the shop; he don't have to go to the trouble of putting scrap into the pig beds, and run the risk of burning every one in the shop as the result of rust, which it is practically impossible to keep off scrap at all times. He don't have one lot of cores so hard that it is almost impossible to file them, and another lot so weak that half of them are broken, notwithstanding the care in handling.

When a casting is ordered to be made in loam, he is capable of reading the drawing and explaining anything about it that the molder don't understand. He knows the cheapest and best way to make that casting, and has it made so; if bad or defective, the result of improper dressing, dampness or such, he don't gaze at it in wonder, but just explains the cause and makes the remedy perceptible. When a pattern is being made that could be molded as well, or better made in green sand as with a core, as is often the case with engine beds and many other castings, he explains to the pattern maker the expense of core sand; that it requires new for every core, and that green sand can be used time and again; and if the pattern maker is not a "hard shell" he will see at once that such suggestions are worthy of consideration, and make the pattern accordingly.

He don't prate about using a few pounds less fuel than others, and lose castings which the making of costs more than fuel for two whole heats with plenty of fuel; he knows that five or ten per cent. of the fuel used would pay for but a small part of the castings lost from slack iron.

After observing the workings of many foundries I have come to the conclusion that the foremen are more to blame for losses than the men under them, and any foreman that would permit waste without an order would permit it with one.

H. O'NEIL.

Engineers' Hand-book.

Editor American Machinist:

Your criticism of the plan to have the American Society of Mechanical Engineers compile a hand-book for their branch of the profession is based upon a misunderstanding of my suggestion. In all matters of engineering, I know that you will admit that one ounce of practice is worth a pound of theory.

I was led to my suggestion by the fact that the hand-book which is considered the best by many professional men, and which has had the largest sale of any book of its kind ever published, is the Engineers' Manual, edited by the German Engineering Society, Hütte. It has run through fourteen editions in a less number of years, and it is so eagerly sought for, that the last edition was published in parts, to satisfy the demand as quickly as possible, all the previous editions being completely exhausted. It seems to me that these facts are a complete answer to any and all criticisms.

The practice of mechanical engineering is in the hands of specialists. One man is the master of the subject of pumps, another of steam engines, a third of cranes, a fourth has devoted himself to electricity, etc.

A hand-book must give the outlines of all these subjects, and no single man can master them sufficiently to perform this task by his own knowledge, so he accepts, without much question, the practice upon these various subjects which he finds endorsed by well known names. To put it plainly, the single compiler of an engineer's hand-book relies more upon his stock of literature, his paste-pot and his shears, than he does upon his own knowledge and experience. The German plan gives a discussion of each subject to experts in that branch. Another advantage of this metnod is the ease with which the work is accomplished. In one case, it is an immense task, in fact, one which cannot be satisfactorily executed. In the other case, by the division of labor it becomes an easy affair for each one of the large number of editors.

It is another matter when we come to the willingness of the American Society of Mechanical Engineers to undertake this task; but that it is perfectly practicable, and would produce a better hand-book than any which we know of in the English language, of that there cannot be the slightest question.

HENRY BINSSE.

Handy Tools.

Editor American Machinist:

Fig. 1 shows a device used with effect at the D. & R. G. shops, Denver. The drawing explains it fully. It is a simple thing, and will put in rod brasses, or remove the same in short order. It is surprising to see in so many shops time wasted on this job by using a wooden block and maul, which are very unsatisfactory means to properly set up rod brasses.

I had long cherished the idea that I had originated in my own breast the acme of tool bars for use on the slotter, and in consequence thereof had saved coppers toward the expense of procuring a patent thereon. But as no man knoweth the general cussedness of his neighbor, it grieved me sorely to find the identical and self-same instrument in actual and permanent use at the D., S. & S. P. R. R. shop, Denver, and as their years of experience corroborated my anticipations in regard to its working, I send you a sketch herewith (Fig. 2) that others who desire may get a useful thing.

I also append on its side a dandy little rig for lubricating the tool—merely a piece of tin bent as shown, and slipped on the bar; a small piece of waste may be packed in the bottom to prevent the too rapid escape of oil.

Fig. 3 shows a simple arrangement, whereby boring and turning at one operation may be done in a lathe; the boring may be either straight or taper, as desired; in roughing out stock or finishing, this combination will be found serviceable, and will pay where much work of this nature is performed; a boring mill will answer the same purpose, but everbody don't have one, hence the suggestion.

L. C. SHARP.

Chilling Iron.

Editor American Machinist:

If your correspondent, who inquires about chilling iron, will use "Spiegeliesen," he can get as deep a chill as he may wish. He will have to get at the proportion by experiment, as it will depend largely upon the per cent. of manganese in the spiegel. I have frequently chilled castings 8 inches thick clear through by mixing it with old car wheels.

H. C. W.

Boring and Reaming Holes.

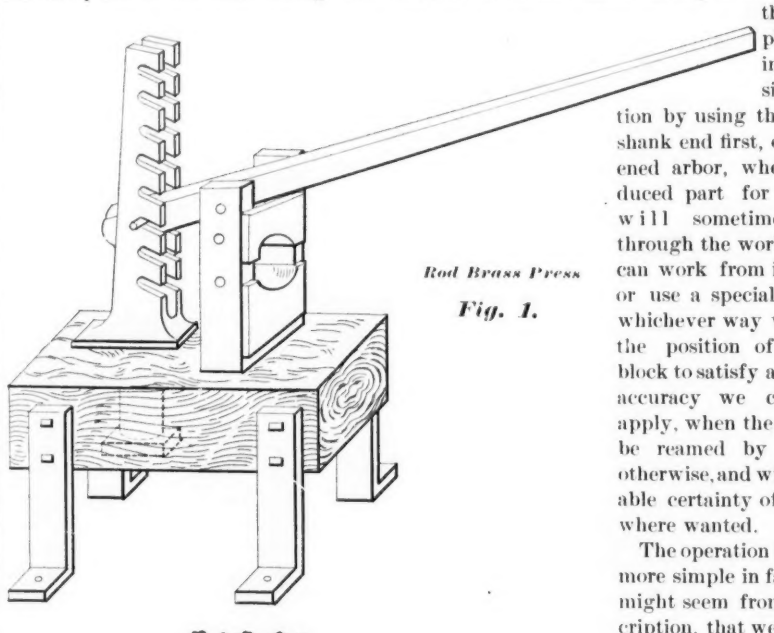
Editor American Machinist:

The article in Dec. 18th number of your paper, by A Mechanic, in which he describes the drilling of a hole "very nearly right," it seems to me requires a number of tools, a number of changes, and after all, with the exception of the final boring with the "single-point cutter," is no better than many other simpler and possibly less expensive ways that might be devised. The way we do such work, where the work will allow, and we seldom find any exceptions, is this: After laying out the hole in the old-fashioned way with center punch and compasses, we scribe the circle slightly smaller than the desired hole, and omit the ornamentation of it with prick punch; we clamp down a block of iron having a hole square through it, and of a size to fit the twist drill we are to use, in the correct position as nearly as we can see by looking down the hole, and at the circle we have scribed, which, being slightly smaller than the hole in block, we can easily do. This block acts as a jig, and very successfully too. These blocks we often make at the time from any piece of scrap we happen to pick up.

If we desire the hole to be reamed, we drill enough smaller to allow for reaming, use another block having a reamed hole through it, place this in the desired position by using the reamer, shank end first, or a hardened arbor, when the reduced part for the dog will sometimes pass through the work, and we can work from its center, or use a special plug; in whichever way we adjust the position of the last block to satisfy any test of accuracy we choose to apply, when the hole may be reamed by hand or otherwise, and with reasonable certainty of its being where wanted.

The operation is so much more simple in fact than it might seem from the description, that we make use of it many times rather than bother with the old way of drawing the hole with center chisel, even on common work.

CHAS S. BEACH.



Rod Brass Press

Fig. 1.

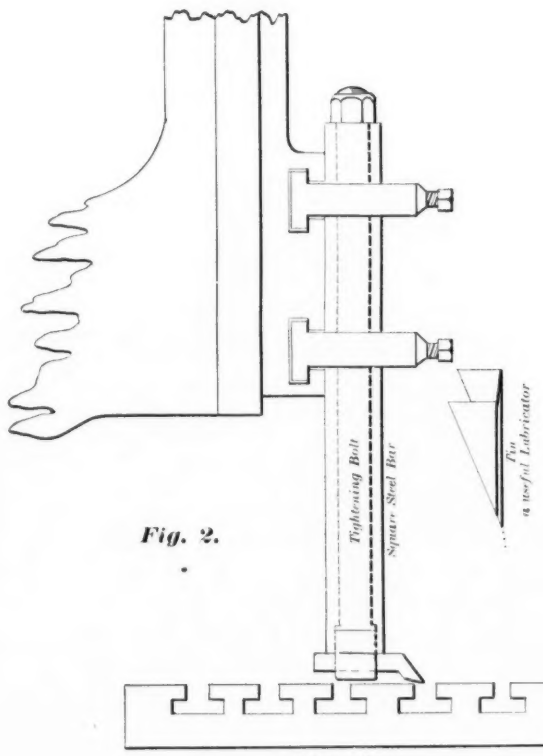


Fig. 2.

Slotter Bar

That Surface Gauge.

Editor American Machinist:

In your issue of November 13 I see a fine adjustment for surface gauge. The solid contact of the washers and scriber the writer (Walter Gribben) believes originated with him. I have been using a surface gauge for the last five years identical with the one mentioned. I made my gauge in Edinburgh, Scotland, in Alexander Leggie's machine shop. The idea, I believe, originated with a turner there. The eccentricity of the scriber is new to me. The idea is a good one.

THOMAS F. HAGGART.
Wellington, B. C.

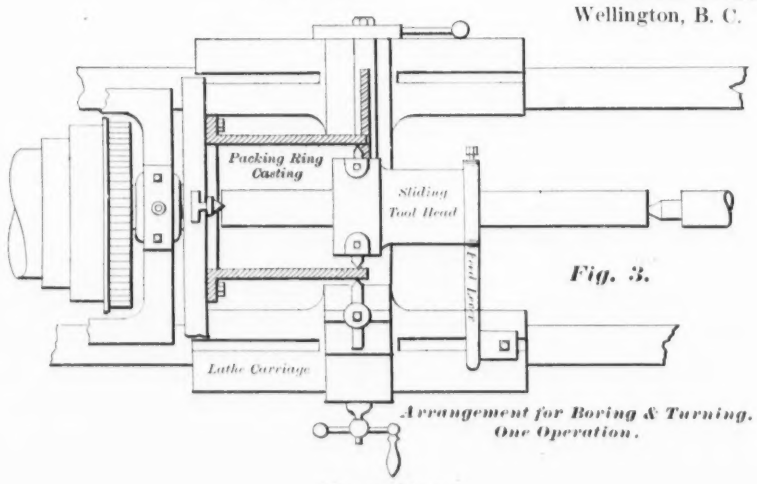


Fig. 3.

Arrangement for Boring & Turning. One Operation.

HANDY TOOLS.

The directors of the Great Western Railway, of England, have decided to put on an express train, constructed on the American system. It will be operated as a matter of experiment.

The German government is at present building eleven large war-ships, and seventy torpedo boats. When one nation indulges in such luxuries others must follow suit, according to present ideas.

A Leather Dog—Gauge for Grinding Chuck Drills.

BY A MECHANIC.

There are so many kinds of dogs, all differing greatly in form and uses, including the poodle dog with all form and no use, that I doubt if any one can give a good definition of what a dog really is.

Some one called this a leather dog. I guess it is. I do not undertake to give this for a new scheme, for I know it is old, but as I traveled over the country a long time without making its acquaintance, and as I now know it to be the best thing for its purpose I have ever found, I believe it would be well if it was more generally known. Fig. 1 (page 7), shows the dog as it is usually cut out of a piece of belting.

I once worked for a foreman who would make a pencil drawing of the work he wanted us to do, and then would say: "Here is the drawing, but you needn't make it like this, though." He was too much of a mechanic to try to hold a man to the sizes that he guessed at, within .001 inch.

This leather dog is the same case. It will work all right when made as I show it, but you can make it to suit yourself.

I suppose a good piece of rawhide would be the best to make this dog of, but a good new piece of belting usually does the business.

I have gone so far and forgot to say what this is for. It is to hold work up to the live center, as is shown in Fig. 2. Screw the face-plate off as is shown, and put on the strap with the small ends through holes in the face-plate, and fastened with the iron pins *A*. Then screw on the face-plate, which will draw the work up, putting the right tension on the strap.

This dog is strong enough for most work. It has the advantage of equalizing the tension, so as not to cramp the work.

It is easy to use, and when not in use takes up little room. It is cheap to make, and, like an Indian's blanket, will fit anything.

In grinding small drills most good machinists do not have much trouble in getting them about right, but sometimes when grinding large chuck drills where there is only .005 or .006 allowed between the size of drill and the standard size, it is found quite hard to get the drill to leave enough stock for reaming.

Most modern shops now have some special rig for grinding twist drills accurately, but I have never seen any special thing to grind flat drills.

I have seen a rig made of a piece of wire, such as is shown in Fig. 1, used with good results in testing the grinding of flat drills.

The idea with this is to hold the drill back on the center, and make a scratch on the wire with one of its corners, as at *A*. Then by turning the drill over, see if the opposite corner corresponds with the scratch. The scratch need not be more than enough to brighten the surface, and as this soon blacks over, a new mark might be made soon after, quite close to the old one, without inconvenience.

In Fig. 2 I undertake to show a way by which this can be improved.

The scratch only helps the eye show how the distance from the center to one corner corresponds with its mate, so if we can make one that will show this more accurately, and also show when the angles are alike, it will be an improvement, provided it is as easy to use.

The idea in Fig. 2 is to have a block made so as to slide along in this wire, one side of which is flattened to provide a bearing for the flat spring *D*, which is soldered to the block, the block being cut away on one side so as to allow the spring to press on the wire so as to produce friction, but not enough to prevent the block being pushed easily with the thumb and finger.

The blade *C* should have friction enough to make it stay where put, but not enough to make it move hard.

We can push the block up till it is a little too short for the longest side of the drill, and

then by holding the drill back on the center, and with one of the cutting edges against the swinging blade as is shown—with the thumb—help the blade to conform with the angle as the drill is pressed down, which will force the block back, and so locates itself.

Now when we turn the drill over we may see how the length and angles differ.

I suppose there are many who will smile at the idea of having anything to assist in grinding such a simple thing as a flat drill.

For such ones all I have to say is that any one who can see all he wants to and as well as he wants to without glasses does not need any; but there are many who do. I have yet to see a man grind a flat drill, say 2" diameter when the cutting edges are short—not a full drill point—so as not to vary in the size of hole it cuts more than two or three thousandths, and be sure of it every time.

There are many little points that are generally considered as not worth notice that really do amount to a great deal in the long run.

If this tool is made and hung up in a convenient place near the grindstone it will be found a useful tool; but if it is kept in the tool-room and only allowed to be taken from there when an order from the foreman accompanies the usual check, it will be of no value at all in the shop.

System.

BY WALTER B. SNOW.

System in shop management is collective in its nature, embodying as it does the idea of a collection and organization of all the separate schemes, plans or systems in vogue throughout the entire establishment. The shop where true system rules is always the one where the work is economically and expeditiously carried on. System and economy are interdependent and inseparable. In fact, true system is but the embodiment of organized economic methods, and consideration of the one inevitably involves consideration of the other.

Nevertheless, there are systems and systems, as in all things else; systems good and systems bad; systems that need but the one missing link to make them productive of economy, and systems that have hardly a redeeming feature. Although too many men still look on system as a mere red tape machine, consuming the time of clerks and men with no beneficent results, yet it is well not to go to the other extreme or hold a system in such reverence as to think it capable of maintaining itself. Surely the brain of man must be behind it, and so long as human mind originates just so long will human mind and hand be liable to err.

System should never interfere with the free exercise of common sense, but should rather be the quintessence of common sense. Don't have a system so complicated and intricate in its workings as to be beyond the comprehension of the men who are to be governed by it. The true success of any system is best secured by its simplicity, and its use will be its own convincing proof of its efficiency.

As a rule, no department in the shop has a better opportunity to organize, apply and enforce system than the drafting room. This department should be the brain of the shop, guiding by its superior knowledge the more physical portion of the work of its various members. Let system begin at home, and let the drawings be so classified, numbered, filed, indexed or catalogued as to be made individually accessible with the least possible expenditure of time. Most obvious of all facts is that the system must be made for the shop, and not the shop for the system, and that it is utterly impossible to dictate a standard system that shall be applicable to all classes of manufactures.

Whether the general or erection drawing and all details of a single machine are filed by themselves, whether they are filed in groups by similarity or kind, or are simply filed consecutively in the order of their completion, must of necessity depend upon the character of the work and the conditions attending it. One point of general advice is, however, always applicable; by all means establish standard sizes for your drawings, the fewer sizes the better. If you have never attempted it, you will be surprised to see how few sizes are necessary to meet your requirements. Many offices use only a single size. The attendant advantages are obvious; system and economy are secured in drawing boards, paper, tracing cloth, blue print paper, drawing cases and a hundred things. Regular materials may be bought or cut in advance to the proper size without waste. The convenience of having in a single drawer, or in a series of drawers, only drawings of the same size, and the facility with which they can be handled, is astonishing to one who has been accustomed to go through sets of drawings varying in size from double elephant to note size in vain searches after drawings of the latter size.

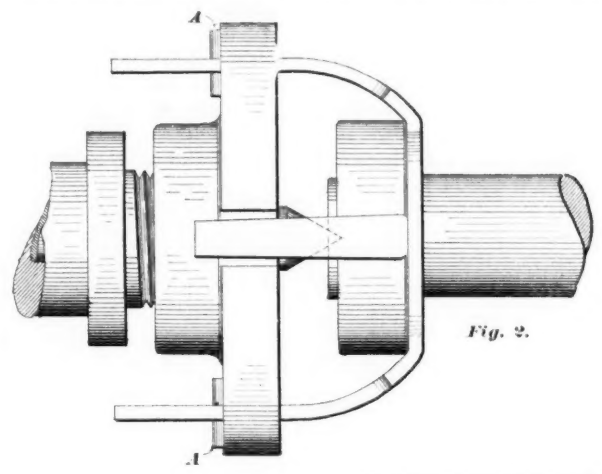


Fig. 2.

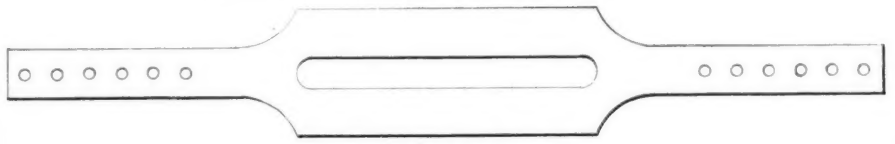


Fig. 1.

A LEATHER DOG.—SEE PAGE 6.

Adopt the best possible method of recording the drawings, the vital consideration being the readiness with which a drawing may be found by means of the records. No system of books can quite equal in convenience capacity for expansion and general accessibility, a good card index. Make it complete, put in all needed cross references, prepare finding lists for the readier finding of groups of drawings; let it be so complete that it can answer all questions regarding itself.

Upon the drawings adopt standards for titles, figures, drawing numbers, cross hotching, center and dimension lines, and the like. Designate material and finish. Make the number of the drawing clearly legible and place it in the lower right and inverted in the upper left-hand corner.

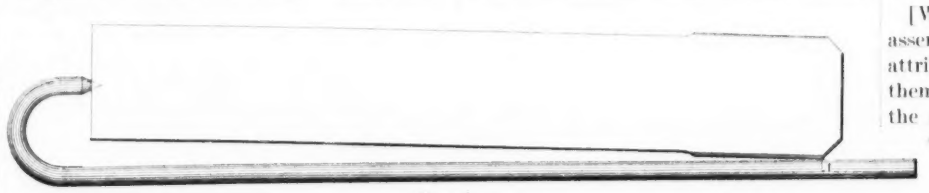


Fig. 1.

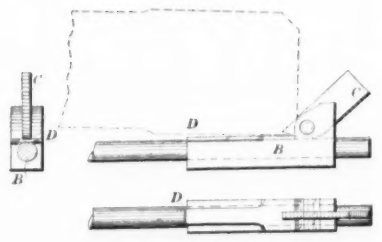


Fig. 2.

GRINDING DRILLS.

In all drafting offices there are certain standard drawings to which constant reference is made. Either provide finding lists for these or else blue print them (if tracings) and arrange them by themselves in accessible places. So far as possible, divide the work, keep certain men on certain classes of work, whenever feasible employ cheaper help to do the tracing; let one boy do all the blue printing, and have the handling of all blue prints sent to or returned from the shop. Let one person attend every night to the filing of all drawings that have been taken out during the day. Have the tracing cloth or paper cut up in quantity by one person. Keep the room neat; inculcate in all the spirit of order. Rigidly examine all drawings before they leave the drafting-room; establish a reputation for accuracy. Know your business and mind it, be positive when you are right, but be ever ready to gracefully accept friendly criticism and well-considered suggestions.

Standardize your machine work, adopt standard screw threads, bolts, nuts, tapers, standard proportions for pins, journal boxes, keys, shafts, etc. Compel adherence to these dimensions, and maintain the principle that all corrections and changes must pass through the drafting-room. Such an example in this department cannot fail to induce like system in the shop, and although it takes time, yet in the end the verdict must be that system pays.

Sketches of an Apprenticeship.

BY W. S. ROGERS.

Our shop didn't have the drawing-room furnished and equipped in all the splendor of to-day in shops of equal size. It was located back of the pattern shop in a little corner room, badly lighted and with worse ventilation, and what drawings were used about the place were generally made by the Old Man.

As he was pretty busy most of the time his drawings were principally of the sketch type; but when he did make a drawing it was easy to understand and comprehend, even by us cubs; no elaborately worded description was needed to explain what it was, which is more than can be said of a great many we see in modern practice.

We cubs didn't bother the Old Man's drawing-room, or "sanctum," as we dubbed it, because all there was in it was an old board on trestles, some real old soiled tools and a lot of yellow-tinted paper scattered around and covered with pencil marks and dust (mostly dust).

The firm decided to build blast furnace engines, and they engaged a real live draftsman to get out designs and plans. You see, when the Old Man made up his mind to do anything he began right at the beginning and hammered right through to success. He didn't go around to his neighbors and get advice and encouragement; neither did he "sit on the fence" and tell his subordinates that he hoped for success in time, until every man in the shop felt the "blues," but there was a ring of decision and foregone success in both talk and action that put enthusiasm into all around him.

Well, the draftsman arrived and was duly installed in the "sanctum." As we cubs had never seen any such adjunct to the shop, we were greatly interested, and it was surprising how many excuses we found for getting to the drawing-room. He was a quiet, mild-mannered old German, was real sociable to us, and smoked incessantly an aged, crooked-stemmed pipe stronger than the foundry crane; but he could *draw*; and the way his designs grew up in beauty and distinctness on that old tinted paper would shame some of us to-day as we draw in and erase a dozen times over, until at last we finish in sheer despair and produce something almost foreign to what we intended.

When I asked him how he did it, he replied: "Well, my boy, I just dream it all out in my head, and I see that machine working nicely; then I make it about three times stronger than it is nice. Then it is easy.

I haven't forgotten. Strength is to beauty as three is to one. Dreaming and designing go together.

The cub that had an impediment in his speech and myself ventured one day to tell the Old Man our desire to learn drawing. That night at whistle time he came to us, and said: "You boys come to my house every Friday night. I'll teach you all I know; it isn't much, but it will help you some day." What a pity there are so few "Old Men" of that stamp to-day.

Even Tom, the foreman, thought it a capital piece of good fortune for us. As I so easily forgot the names of tools, and the other cub stammered so bad he could not tell his wants, Tom said we could make drawings of our needs and get the work done in about one-tenth the time it required him to find out our ailings and troubles.

A Correction of the Records.

Geo. Marshall, of the boiler-making firm of Graves & Marshall, Dayton, Ohio, writes us:

The proceedings of the A. B. M. A. have just reached me, and on pages 66 and 67 of same, I am charged with saying [referring to boys]: "They receive very different treatment to what I received. I went into the Holly shops, and I had to steal my trade, and I have been sorry often since that I did not steal the tools. The treatment I received there—and I think it was better than the average—was such as to discourage any American boy; and I have got past that now, and to-day I am trying to sell as poor a boiler at as large a price as I can get."

Some of your staff will probably recall these remarks, and remember they were not made by me, but by quite another person.

Will you kindly refer to this matter in the AMERICAN MACHINIST at an early date, and place me right before the mechanical public.

GEO. MARSHALL.

[We believe Mr. Marshall is quite right in asserting that he did not make the remarks attributed to him, or anything equivalent to them. The mistake probably came from the reporter catching the wrong name of a speaker, and could have been corrected in the manuscript, if advance proofs had been sent, as is customary in the instance of the proceedings of societies. This would or should have saved the mortification of a member being credited with what he did not say.]

There has been in this country for the last three months, elements enough at work to bring about a first-class financial panic; elements that would in the past have brought about such a panic. But it has not come, and one substantial reason for this is the stability of the solid manufacturing interests of the country; interests established on a solid basis. Not the interests established on a Wall street basis, or that are connected with some land or other scheme, but those interests that have grown up in legitimate trade. These interests, while progressive, are conservative, and their efforts have been towards the settling of business matters. They do not make money on the losses of others, and they stand as firmly as they can for progressive conservatism. So far they have withstood all efforts to seriously disarrange business. We trust they may be able to so stand. Their power to do so increases year by year, which is an excellent thing for the country.

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J. G. A. MEYER, } Associates.
FRED J. MILLER, }

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☞ Every correspondent, in order to insure attention, should give his full name and address, not for publication, but as a guarantee of good faith.

☞ We are not engaged in procuring patent rights, or in selling machinery, nor have we any pet scheme to advance, or hobby to ride.

☞ We invite correspondence from practical machinists, engineers, inventors, draftsmen, and all those specially interested in the occupations we represent, on subjects pertaining to machinery.

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NEW YORK, JANUARY 1, 1891.

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The New Year.

This issue will come to our readers on the first day of the new year—1891, and we take the occasion, while hoping they may have had a merry Christmas, of wishing them—one and all—a happy new year.

We have put the AMERICAN MACHINIST into a new dress of type, which we trust improves its appearance, and we shall endeavor for this year, as in past years, to please our friends. We have every occasion to rejoice in the prosperity of the past year, and hope the same has been the case with every one who reads this. Thanking our readers for past favors, we again wish them a happy new year, and a prosperous 1891.

Business Prospects for 1891.

According to our usual custom at this time of the year, we publish in this issue a number of letters from representative business men—manufacturers of and dealers in machinery and mechanical appliances—in various parts of the country, written at our solicitation. We refer our readers to these letters as affording evidence of the general prosperity of the past year, and opinions as to the prospects for the coming year. These opinions the careful reader will take as a whole, and from this will be able to arrive at a good conclusion as to what machinery manufacturers, as a rule, think of coming prospects. We prefer he shall do this for himself rather than to give any general summing up of the matter. The letters come from men who are alert in looking ahead, and we are sure will be read with interest.

Here and There.

We have before this referred to what appears to be a fact, viz., that while in European workshops the workmen receive less pay than here, as they get above the position of day employes this difference begins to disappear, and finally the conditions are entirely reversed. Seven to ten thousand dollars a year are figures, we believe, much more commonly paid to head mechanical men in Britain than here.

The reason for this is not plain, unless we assume that there are proportionately more men here than there who have enough knowledge of mechanics to enable them to get along fairly well in positions of mechanical responsibility. Or we may assume—and perhaps this is the more reasonable—that the number of establishments requiring high mechanical talent at the head is greater there than here; greater because of the greater number of engineering and mechanical establishments, and greater because open competition demands low cost of production, and hence careful consideration at the beginning. But if there are comparatively more men here who by some kind of training have fitted themselves, in a way, to manage the mechanical departments of our manufacturing industries, there are less who can take right hold of the tools of a trade and do a day's work in their line.

Mind, we do not say that there are better mechanics in Britain than here. That would not be true. But there a mechanic works at the branch of mechanical work which he has learned—sticks to his last, as it were. This, dating from thirty years back, has gone out of fashion in this country. About as long ago as that the writer had charge of "setting up" milling machines to be used by the United States Government. Finding that men at the arsenal were making much better wages running these same machines than he was making in putting them in condition to be run, application was made there for a "job." But unfortunately—say foolishly—the fact was let slip that he put a long line of machines in the building in shape for work. That settled the whole matter. There was plenty of work for him in looking after the welfare of these machines at the pay of a machinist, but a shoemaker or a carpenter could make seventy-five per cent. more wages running them than he could in making them run. Such things may be for the best, but they are not encouraging.

The Secretary of War advocates the establishment on the Pacific coast of an arsenal equipped for the manufacture of modern guns to be used in coast defense. It is estimated that the Watervliet Arsenal at West Troy could complete the guns needed for the Atlantic coast in twenty-two years; for the Atlantic and Gulf coasts, twenty-six years; and for these with the Pacific coast about forty years. Many of us will be beyond the need of guns for our protection by that time, and if guns are needed for coast defense it would seem to be desirable to get them ready for operations sooner. We have faith to believe that none of them will ever be needed; but so long as there are vast sums of money to be spent for the people in some way, we favor spending it for such things as the magnificent modern gun. It is representative of the present attainments in the mechanic arts, and its manufacture has a direct influence in developing them for greater usefulness in directions calculated to advance the welfare of mankind. Some day, perhaps, the people will have a better realization of the fact that the Government is supported by them, and from their pockets derives its revenue. When they do have this realization, expenditures will be, perforce, cut down; but, in the meantime, there is no better way of spending the money than for the splendid pieces of machinery known as the modern gun.

The establishment of a large arsenal on the Pacific coast and its equipment would prove a good thing for the tool builders, and the effect of the contracts would probably be felt all through the machinery interests.

A charitable organization has been incorporated in the State of New York for which there seems to be a very large field for operations. It is called the "New York Society for the Protection of Legal Rights." Its principal object will be to assist worthy persons who have legal rights which have been infringed upon and which they are financially unable to maintain.

It would seem to be desirable that courts should be so managed that any one, no matter how poor, could maintain his legal rights in them. A poor man, unable to pay for the services of a lawyer, should be able simply to go before a judge of a court with his witnesses, tell his side of the story in as plain English as possible and secure justice without expense. But as things are, and as they are likely to be for a long time, it takes money to secure justice usually, and a society organized to help those who have no money in their unequal fight for justice ought to find plenty to do.

Literary Notes.

MECHANICS OF ENGINEERING AND OF MACHINERY. By Dr. Julius Weisbach. Volume III., Part I, Section II. The Mechanics of the Machinery of Transmission. Second Edition. Thoroughly revised and greatly enlarged, by Gustav Herrman, Professor at the Royal Polytechnic School, Aachen, Germany. Designed as a Textbook for Technical Schools and Colleges, and for the use of Engineers, Draftsmen, etc. Translated by J. F. Klein, D. E., Professor Mechanical Engineering, Lehigh University, Bethlehem, Pa. Authorized Translation: With more than four hundred fine illustrations.

This volume is an addition to those previously published treating on Mechanics of Engineering, written by the same author. The opening Chapter, IV., treats on flexible transmitters, and includes the strength and comparison of hempen ropes, wire ropes and chains, also different forms of sheaves and guide pulleys. In Chapter V. screws in general, helical motion, differential screw, relations of the forces acting on screws, screw wheels, and dimensions of screws are considered; and in Chapter VI. crank trains are taken up. Chapter VII. is devoted to cam trains, and in Chapter VIII. engaging and disengaging gears are considered. Chapter IX. treats on different kinds of brakes, regulators, counterweights, flywheels and governors, but among the latter we do not find any illustrations of shaft governors, such as are now so extensively used on stationary engines. The appendix contains graphical statics of mechanisms. This is an excellent work, finely illustrated, and, like its predecessors, will give valuable assistance to the engineer, draftsman and others engaged in designing machinery. The book is published by John Wiley & Sons, 53 East Tenth street, New York. Price $5.

THE EARLY HISTORY OF STEAM NAVIGATION. By Geo. W. Buckwell, M. I. M. E. (Whitworth Scholar), Board of Trade Surveyor. Reprinted from "The Steamship."

This little paper-covered volume of sixty pages gives a history of steam navigation from June, 1543, up to 1866. It is written in a popular and very interesting manner, and will undoubtedly be appreciated by those who are interested in historical facts and dates. It is published at the offices of "The Steamship," 2 Custom House Chambers, Leith. Price of the book is not given.

FIFTH ANNUAL REPORT OF THE COMMISSIONER OF LABOR.

This report, a copy of which we have received by the courtesy of the Commissioner, Carroll D. Wright, is confined entirely to railroad labor, and goes into the question in an exhaustive manner, the book contaning 888 pages, mainly tables giving detailed information upon almost every imaginable matter connected with the subject treated. One chapter is devoted to the Relations of Employes and Corporations, in which such matter as the restrictions placed upon the use of intoxicating liquors, dwelling houses, beneficiary institutions, accidents and employers' liability therefor are treated in full.

In the introduction it is stated that the whole number of railroad corporations in the U. S. on the 30th of June, 1889, was approximately 1,718, and the mileage 156,400. The number of employes was 689,912, of whom 135,580 were trainmen, and 31,896 switchmen, flagmen and watchmen. Nearly 600 of the roads are under 20 miles in length, and the shortest is only fourteen one hundredths of a mile long. All but about 800 of the roads are leased to the others, and about 600 roads practically control the business of the country. Three hundred and seventy-seven companies prohibit the use of intoxicating liquors altogether, the remainder having no rules, but dealing with cases separately as they come up. A great deal of information is given regarding beneficiary institutions, the practice of a large number of roads being given, together with the views of the chief executive officers of the leading organizations of railway employes upon the subject, with statements of what has been and is accomplished by the several orders in this direction. Statistics of accidents are given, and the famous British "Employers' Liability Act," printed in full, together with the law of a great many of the States upon the subject, with some decisions of the courts under them.

At pages 143-4-5 are tables which will be most interesting perhaps to railroad men, as these show the average daily and yearly earnings of the different classes of employes by groups of States over the country, and for the average of the whole country. According to these tables the average wages of blacksmiths in different groups vary from $2.06 to $3.11 per day, and the average for the country is $2.19. Brakemen's wages vary by groups from $1.26 to $1.96, and average for the country $1.78. Carpenters' wages vary by groups from $1.89 to $3.07, and average for the country $1.98. Engineers' wages vary by groups from $2.79 to $3.55, and average for the country $3.22. Machinists' wages vary by groups from $2.05 to $3.06, and average for the country $2.18. Machinists' and blacksmiths' wages are highest in the seventh group, which includes the Pacific States and territories, and lowest in the second or middle Atlantic group. Engineers are highest in the fifth or southwestern group (their wages not being given for the Pacific group), and lowest in the sixth or northwestern group. Wages of all employes who are paid by the mile, trip, piece, contract or commission are not included in these tables. If they were the rates would probably be somewhat higher.

The report as a whole gives evidence of

much painstaking and skillful labor, and will well repay study on the part of those interested. We hope every railroad and public library will be supplied with a copy.

QUESTIONS AND ANSWERS.

Questions of general interest relating to subjects discussed in our columns will receive attention in this department. The writer's name and address should always accompany the question. Neither correct initials nor location will be published when there is a request to that effect. If questions are enclosed with a business communication, they should be written on a separate sheet.

(1) A. A., Akron, O., asks: Will a steam engine cylinder surrounded by exhaust steam be more economical than if left exposed to the atmosphere at an ordinary temperature? *A.*—No; either way is bad practice. The cylinder should always be well lagged.

(2) C. F. B., Philadelphia, Pa., asks: Is the Springfield Martini-Henry rifle the same make as that manufactured by the Martini-Henry Rifle or Arms Works? *A.*—We do not know. You may obtain this information by writing to the superintendent of the Springfield Armory. Your second question is out of our line.

(3) W. H. J., Laredo, Texas, writes: I would like to have a book on the valve and link motion, or on the link motion alone. I would like it to give the proportions for new links, and I would also prefer a moderate-priced book. *A.*—The articles on "Modern Locomotive Construction," recently concluded in the AMERICAN MACHINIST, will give you the information you seek.

(4) J. B. W., New York, writes: Please inform me if I can feed my boiler by gravity without traps or pumps. I have 16 radiators, 640 square feet of heating surface four feet above water-line in boiler. Can I return the water, due to the condensation of steam, to the boiler against 30 pounds boiler pressure? *A.*—You cannot return the water into the boiler without a trap, or a pump, or an injector.

(5) J T. V., Plainfield, N. J., writes: Please give me a receipt for making a preparation similar to babbitt metal that will fill up holes in castings and will look like cast-iron when polished. I used to have one a number of years ago, and, having no use for it, it has been lost, and now I can put it to some use. *A.*—Try the following: Lead, 9; antimony, 2; bismuth, 1 part. This metal expands in cooling, and is considered to be useful in filling small defects in iron castings.

(6) D. C. W., Cumberland, Md., asks: Is there any work published on the subject of heating and ventilating by the use of steam, hot water and hot air, with their various systems, giving data on the size of steam and hot water radiators, size of steam and water pipes, and, in fact, all the information necessary to design a heating plant? *A.*—Hot Water Heating and Fitting, by W. J. Baldwin, and Steam Heating for Buildings, by the same author, may give you the desired information.

(7) T. M., Joplin, Mo., writes: Can you inform me where I can obtain German books and journals treating on mechanical matters? Also please mention such books as will give a thorough knowledge of German machine shop practice, and the practice in pattern shops and foundries. *A.*—Write to the International News Company, New York City, for a catalogue. We believe that you can make a more satisfactory selection than we can recommend to you, as we have no idea of how far you have advanced in technical literature.

(8) E. D. L., Brooklyn, N. Y., asks: What will be the pressure on a safety valve $2\frac{1}{2}$ inches diameter, with a steam pressure of 50 pounds in the boiler? Please give a rule. *A.*—Multiply the area in square inches of the safety valve, that is, the area of the opening, by the pressure per square inch; the product will be the total pressure on the valve. If the diameter of the opening is $2\frac{1}{2}$ inches its area will be $2\frac{1}{2}x2\frac{1}{2}x.7854 = 4.90875$, and this multiplied by 50 gives 225.4375 pounds for the total pressure on the valve.

(9) Apprentice, Hamilton, Canada, writes: Kindly inform what rules must be observed for entering the U. S. Navy as an engineer, what are the required qualifications, and what will be the probable position assigned to a person after leaving the machine shop? *A.*—In order to become an engineer of the U. S. Navy you will have to be a graduate from the Naval Academy at Annapolis; and to become a member of this institution you will require an education equal to that of the graduates of our best public schools, and the influence of prominent men.

(10) J. A. S., Creston, Indiana, writes: I do not understand how to extract the 1.4, 2.45, etc., root of a number; neither do I understand how to get the 1.4 or 2.45 power of a number. If you can give me any information regarding this subject I would be pleased to have you do so. *A.*—The easiest way to find the root or the power of a number is by logarithms. A table of logarithms and its use are given in all good elementary geometries. For instance, Davies' Legender, Loomis' Elements of Geometry, or Elementary Geometry by Olney, and many others contain tables of logarithms of numbers and rules for finding the roots and powers of numbers. There is nothing difficult about this matter, and a few evenings' study and practice should enable you to work out any examples of this kind.

(11) F. M., Chelsea, Mass., writes: Please give a description of machinery that will exactly fit a steam launch 25 feet long, $5\frac{1}{2}$ feet beam. I would like a description as is given in your issue of June 5, current volume, of steam yacht "Mydia." Give either a simple or compound engine which would give a speed of 9 miles an hour. *A.*—The size of engine will depend on the draught and lines of the boat, which you have not given; we can therefore give you only an approximate size of engine. We should adopt a compound condensing engine; high-pressure cylinder, $2\frac{3}{4}$ inches diameter; low-pressure cylinder, $5\frac{1}{2}$ inches diameter; stroke of both cylinders, 4 inches. The space in these columns will not permit us to give the dimensions of the details.

(12) J. W. K., Dana, Iowa, writes: Please tell me of the best way to fix an engine which has $\frac{1}{2}$ inch clearance between the cylinder head and piston. What will be the loss due to this clearance? The cylinder is $7\frac{1}{2}$ inches diameter; stroke, 10 inches; number of revolutions, 265 per minute; boiler pressure, 100 pounds; cut off at $\frac{3}{8}$ of the stroke. How much clearance should there be between the piston and cylinder head? The engine is used for threshing, and is of the locomotive type. *A.*—The piston clearance will depend to a great extent on the construction of the connecting rod; if the length of this rod is increased by keying up the brasses, $\frac{1}{8}$ of an inch clearance at the crank end of the cylinder may be sufficient, and $\frac{1}{4}$ of an inch at the other end. For a clearance as small as this you will have to keep the engine in first-class running order. If the bearings are allowed to wear too much there is a liability of knocking out the cylinder heads. The clearance can be reduced by allowing the cylinder heads to project further into the cylinders. We cannot say what the exact amount of saving will be without knowing the whole clearance; that is, the volume between the valve seat and the piston at the end of its stroke. The saving will probably not be very great. An earlier cut-off will effect a saving, provided the engine is large enough to do the work with an earlier cut-off.

(13) A. W., Fort Plain, N. Y., writes: We have a tubular boiler 2 feet diameter 6 feet long; the fire-box is 2 feet square. We use natural draught and burn the best quality of soft coal. The boiler is covered with asbestos, which is in contact with the shell. Is this right? Or should there be an air space between them? *A.*—Asbestos covering is generally placed close to the shell, without any air space between them. 2. We use Stephenson's incrustation powder in the boiler. Will this damage the boiler? *A.*—We have never used this compound, and, therefore, cannot advise you. We have very little faith in compounds for preventing incrustation. In many cases a small amount of kerosene will answer the purpose well, and this will not hurt the boiler. 3. The boiler drives a 6x8 inch common slide valve engine. How much coal should I use? *A.*—Usually 6 to 8 pounds of coal per horse-power per hour is a fair allowance for small engines of this class when they are properly proportioned for the work they have to do. 4. Some time ago we had trouble with our injector. I was told that the soda which we used at the time in the boiler was the cause of it. Is this correct? *A.*—We do not believe that the trouble can be attributed to the use of soda; the cause was probably due to not handling the injector correctly.

(14) J. P. S., New York, asks: What would be the horse-power of an engine necessary to drive a boat 175 feet long, 35 feet beam, a draught of 15 feet, and at a rate of 20 miles per hour? What would be the dimensions of a triple expansion engine suitable for the purpose, to make 75 revolutions per minute and use steam at 100 pounds? If two boilers are to be used what would be the dimensions of the boilers, and how much coal would they burn per hour? *A.*—For so high a speed as you wish to obtain your steam pressure and number of revolutions are too low; these conditions will make the engine excessively large. We should use a steam pressure of 160 pounds and number of revolutions, 150 per minute. The horse-power of the engine will depend on the lines of the boat, and since we know nothing of these, we can only give an approximation. The indicated horse-power will have to be about 2,200. With 160 pounds boiler pressure and 150 revolutions per minute, the high-pressure cylinder should be about 23 inches diameter, intermediate cylinder 32, and low-pressure cylinder 52 inches diameter, all 32 inches stroke. The aggregate grate surface in the boilers should be about 130 square feet, and the aggregate heating surface about 4,500 square feet. The probable consumption of coal will be about 3,500 pounds per hour, and for speed of 20 miles an hour you will need a forced draught. In designing an engine for a boat of this kind many things have to be taken into consideration, and if you intend to build one we should advise you to employ a first-class engineer.

(15) J. H., Rochester, Minn., writes: Kindly state what amount of clearance (not regarding port capacity) between piston and cylinder heads is considered good practice in small slide valve engines of say 8x8 inches and smaller, running at 250 to 300 revolutions? Also what relation does the amount of clearance have to smooth running? *A.*—The general practice is to make the clearance between piston and cylinder heads in small engines as small as the wear of journals and inaccurate workmanship will allow. In designing an 8x8 inch engine we should allow not more than $\frac{1}{4}$ of an inch for piston clearance. The rough surfaces of the piston and cylinder heads and a little inaccurate workmanship here and there will often reduce this clearance when the engine is set up; but so long as there is no danger of the piston striking the head in keying up the connecting rod, a reduction of this clearance will do no harm. For engines much smaller than 8x8 we should endeavor to get along with $\frac{3}{16}$ inch clearance, or even less. There is no particular relation between the amount of piston clearance and the smooth running of the engine, but there is a relation between the latter and the total or engine clearance. If the engine clearance is too small, the compression may rise above the initial pressure; and if the clearance is too large, the compression may not reach the pressure of the steam at the point of release; in either case pounding is likely to ensue. The best practice is to regulate the clearance in designing an engine so that the compression will be equal to about $\frac{3}{4}$ of the initial steam pressure. The above refers to the common slide valve engines. For single valve automatic engines the piston clearance may have to be increased so as to prevent the compression from rising above the initial steam pressure when the engine is cutting off at the earliest point.

BUSINESS SPECIALS

Transient Advertisements 50 cents a line for each insertion under this head. About seven words make a line. Copy should be sent to reach us not later than Friday morning for the ensuing week's issue.

Grant's (1891) gear catalogue ready. See adv. p. 20.

Link-Belting and Sprocket Wheels.
Send for Catalogue of Link-Belting.
Over 50,000,000 feet of Link-Belt in use.
Link-Belt Engineering Co., Philadelphia and N. Y.

Shafting Straighteners. J. H. Wells, Tampa, Fla

Help in Your Studies. I. D. Boyer, Dayton, O.

"Bradley's Power Hammers, the best in the world." 20 sizes. Bradley & Co., Syracuse, N. Y.

The Improved Justice Hammer. Williams, White & Co., Moline, Ill., manufacturers.

Pattern and Brand Letters. A variety of sizes and styles. Heber Wells, 8 Spruce St., New York.

Davis Key-Seating Machines kept in stock by Manning, Maxwell & Moore, 111 Liberty St., N. Y.

The best Upright Hammers run by belt are made by Jenkins & Lingle, Bellefonte, Pa.

Ice and Refrigerating Machines, 155 sold, and all successful. David Boyle, 521 Monroe St., Chicago, Ill.

Get particulars of our new Wall, Suspended and Radial Drills. C. H. Baush & Sons, Holyoke, Mass.

Selden Packing for stuffing-box, with or without rubber core. Randolph Brandt, 38 Cortlandst., N. Y.

Adjustable Shrinkage Gauges. Pedrick & Ayer, Philadelphia, Pa.

Link Milling and Slotting Machine. Pedrick & Ayer, Philadelphia, Pa.

Light Special Machinery and Tools to order. The Meriden Machine Tool Co., Meriden, Conn.

Audubon Machine Works, New Haven, Ct. Electrical work, superior facilities, builders of machinery, heavy and light.

Curtis Pressure Regulators. Curtis Return Trap. Curtis Damper Regulator. See Dec. 18, p. 18. Send for circular No. 17. Curtis Reg. Co., Boston, Mass.

Guild & Garrison, Brooklyn, N. Y., manufacture steam pumps, vacuum pumps, vacuum apparatus, air pumps, acid blowers, filter press pumps, etc.

For the Latest Improved Diamond Prospecting Drill, address the M. C. Bullock Mfg. Co., 138 Jackson St., Chicago, Ill.

S. W. Card & Co., Mansfield, Mass., make everything in the line of Taps and Dies. S. A. Smith, 23 S. Canal St., Chicago, Western Agent.

Billings & Spencer Co.'s Packer & Boiler Ratchet, & all kinds of Forged Wrenches. S. A. Smith, 23 S. Canal St., Chicago, Western representative.

25" } "Only Drill Press built on
32" } 'Ko-rekt' principles,
37" } even if they come from Jersey."
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Patent Attorney R. G. DuBois, 715 11th street, Washington, D. C., procures 1st-class patents for inventors. Send for pamphlet. Guaranteed by Rand, McNally & Co., of Chicago.

Patent Soliciting of High Class.
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Send for Brief History of Patent Legislation.

Agents wanted in every town and village in the United States to sell our clipper knife and scissor grinder, something that every housekeeper should have; liberal terms. For particulars address Montgomery & Co., 105 Fulton street, New York City.

Every draftsman needs one. The Engineer's Sketch Book of mechanical movements, appliances, devices, contrivances, etc., by T. W. Barber. 1,936 illustrations, 8vo. cloth, $3. Catalogue of books on mech. subjects free. E. & F. N. Spon, 12 Cortlandt St., New York.

De Lamater Screw Propeller Wheel made only by The Samuel L. Moore & Sons Co., Elizabethport, N. J., who have purchased from C. H. De Lamater & Co., New York, all their patterns, books of record, gauges, etc. Location and equipment well adapted for Heavy Steamship Repairs.

Stub Ends and Connecting
Rods for small connections.
Especially adapted for Valve
Rod for Steam Engines.
T. C. Dill Machine Co.,
Philadelphia, Pa.

"Your Hand-book of Calculations arrived safely; it is a splendid book for the machinists of this country; will recommend it to the members of our organization. Jos. J. Creamer, Grand M. M., National Asso. of Machinists." Hawkins Calculation, sent free of post for $2.50. Theo. Audel & Co., Publishers, 91 Liberty street, N. Y. (See AMERICAN MACHINIST, Oct. 23.)

Just Ready—New Catechism of the Locomotive. The most complete treatise on the construction and operation of the locomotive, by M. N. Forney, M. E. 688 large pages, with 488 engravings, 6 large folding plates, and 20 full-page plates of various styles of locomotives. Sent by mail, free of postage, $3.50. Frederick Keppy, Scientific Book Publisher, Bridgeport, Conn.

"Binders" for the American Machinist. Two styles, the "Common Sense," as heretofore sold by us, and mailed to any address at $1.00 each, and the "New Handy," mailed at 50c. each. The former has stiff board covers, while the latter has flexible covers with full page opening flat. Either will hold the entire 52 issues of any volume. American Machinist Publishing Co., 96 Fulton St., New York.

"Indicator Practice and Steam Engine Economy." By F. F. Hemenway. Contains plain directions for using the indicator and making all required calculations from the diagram, also the principles of economy in operating steam engines and current practice in testing engines and boilers. Price $2, postpaid. Published by John Wiley & Sons, 53 East 10th St., New York.

MANUFACTURES.

There is a prospect of an iron foundry being put in at Weatherford, Tex.

A stock company is organizing to erect a cotton-mill at Greenville, Tenn.

Car wheel works are being erected at Jefferson, Tex., by the Lone Star Iron Company.

The Smead Foundry Company has been incorporated at Toledo, Ohio; capital $80,000.

The Peninsular Car Works, of Detroit, Mich., will probably be removed to Seattle, Wash.

Major Orrell is corresponding relative to the erection of a cotton factory in Fayetteville, N. C.

A foundry and machine shop have been added to the Rash Iron Railing Works, at Florence, Ala.

The Southern Machinery Company, Atlanta, Ga., contemplates increasing its capital stock $50,000.

The Batesville Iron Works will probably add an iron foundry to its machine shops, at Batesville, Ala.

A $50,000 company has been organized at Buchanan, Va., to establish agricultural implement works.

A foundry and machine shop will be established at Austin, Texas, by the Lone Star Ice Works Company.

The Chattanooga (Tenn.) Car and Foundry Company is rebuilding its foundry which was lately burned.

The Canton Malleable Iron and Manufacturing Company is a new concern at Canton, Ohio; capital $100,000.

The Manchester Manufacturing Company of Macon, Ga., will put additional machinery in its cotton-mill.

The Texas Rolling-mill Company, recently incorporated at Fort Worth, Texas, have a capital stock of $50,000.

The King Hardware Company has been organized and incorporated at Anita, Ia.; capital stock, $6,000 to $10,000.

The Adams Saw-mill Works of Chattanooga, Tenn., are adding an iron foundry, machine and boiler shops.

The Laughlin Nail Company, at Martin's Ferry, Ohio, will add 25 more nail machines to its already extensive plant.

The Tacoma (Wash.) Foundry and Machine Company are erecting a large bolt shop in connection with their works.

Arrangements are being made for the erection of an ice factory at Darien, Ga. Sinclair Bros. can give information.

The agitation at Seymour, Texas, for a roller-mill and elevator continues, and the matter is being brought to a focus.

J. F. Johnston, of Birmingham, Ala., is negotiating with a party for the construction of a $125,000 rolling mill in Jasper.

At Cumberland, La., the Cambria Iron Company is reported as putting in new machinery and enlarging its rolling-mill.

The machine shops of the Missouri, Kansas and Texas Railway Company, located at Greeville, Texas, are to be enlarged.

The Waverly Lead and Zinc Company, Waverly, Kan., is a recently incorporated concern with an authorized capital of $200,000.

It is stated that negotiations have been closed with a New England company to locate $250,000 metal works in Savernake, Va.

The Norfolk & Western Railroad Company's car wheel works at Roanoke, Va., will employ two hundred men when completed.

Mr. Farnesworth, will, it is reported, organize a $25,000 stock company to erect an iron foundry and machine shops at Bristol, Tenn.

It is stated that the Tredegar Cotton Manufacturing Company, P. O. Jacksonville, Ala., has been organized to erect a cotton-mill.

The Fort Worth and Denver City Railroad Company will, it is reported, erect a new machine shop, 50x100 feet, at Clarendon, Texas.

At Johnson City, Tenn., a company from Rochester, N. Y., will establish plant for the manufacture of railway cars; capital $100,000.

The Honey Grove (Texas) Ice and Electric Company has been organized, and will soon build an ice factory and put in an electric light plant.

M. T. Holland, of St. Louis, will, it is reported, establish in Middlesborough, Ky., works for the manufacture of steam and water registers.

The American Bridge and Iron Company, of Roanoke, Va., will rebuild at once its iron foundry and machine shop, which was burned last week.

At Covington, Va., a stock company will operate a nail factory to employ 400 hands. A blast furnace will also be erected, with a daily output of 125 tons

The Principio Forge Company, of Wheeling, W. Va., has been incorporated by W. P. Tyler, of Washington, Pa., O. E. Whitaker, E. C. Ewing and others.

E. J. Lowenstein, representing New York parties, is investigating with a view of organizing a $100,000 stock company to erect a silk-mill in Hagerstown, Md.

The St. Louis, Arkansas & Texas Railroad Company (office, St. Louis, Mo.,) is reported as having secured site, and as to erect car shops in Pine Bluff, Ark.

Letters patent of incorporation have been issued to the Edward Best Car Axle Box and Lubricator Company, of Ottawa, Can., with capital stock of $25,000.

The contract is reported as having been signed for the establishment of an iron foundry at Waynesboro, Va., in which the Waynesboro Company is interested.

Arrangements are nearly completed for the establishment of a furniture factory at Marshall, Texas, about $8,000 having been already subscribed for the purpose.

The Southern Machinery Company have been organized at Atlanta, Ga., for the purpose of doing a general busines in railway equipment, machinery and supplies.

It is stated that the South Raleigh Improvement Company will be incorporated at Raleigh, N. C., to build a $150,000 cotton factory, a cotton-seed-oil-mill and fertilizer factory.

The Allen Machine Works has been formed at Chicago, to manufacture machiney; capital stock, $25,000; incorporators, Lyman A. Booth, Charles A. Buell, and S. C. Samuel.

It is stated that a stock company has been organized at Roanoke, Va., with R. H. Woodrum, president, to manufacture the patent electric railway motor of Mr. Black.

The Laredo (Texas) iron foundry has been sold to an Ohio capitalist. About $7,000 worth of new machinery will be added, which will make it one of the finest plants in the State.

The Crucible Iron and Steel Works, East St. Louis, will nearly double their capacity by the erection of a new foundry 100x64 feet. The improvements will cost $100,000.

Arrangements have been completed whereby a roller-mill, ice factory and improved gin will be erected, all by the same company at Mason, Texas. About $75,000 will be invested.

The organization of a $25,000 stock company to establish works for the manufacture of car axles, shafting, etc., is talked of at Dallas, Texas. Alderman Hughes can give information.

The Scoville Iron Works has been incorporated at Chicago, to conduct foundry and machine shops; capital stock, $75,000; incorporators, H. H. Scoville, F. B. Macomber, David D. Drummond.

A $100,000 plant, consisting of machine shops and foundries, wood-working departments, offices and mill supplies, warehouse, flouring mill and grain elevators, will be erected at Salem, Va.

At a meeting of the directors of the North Carolina Steel and Iron Company, Greensboro, N. C., held on the 16th inst., it was decided to proceed at once with the construction of a 120-ton iron furnace.

The Owen Automatic Signal Company, of Lynchburg, Va., has been incorporated, with C. C. Dunn, Jr., president, and W. H. Wren, vice-president, to manufacture the R. O. Owen patent railway signal, etc.

The Sherman Seamless Bag Company, of Sherman, Texas, recently reported as incorporated, manufacture bagging, will erect a new factory 335x110 feet, with a capacity of 6,000 bags per day.

A license of incorporation has been granted to the Illinois Alloy Company, Chicago, to manufacture metallic alloys; capital stock, $25,000; incorporators, E. L. Chamberlain, G. W. Clark and J. A. Fanning.

The West Point Manufacturing Company, at West Point, Ga., it is reported, will add $50,000 worth of machinery to its cotton-mill soon. This will increase the consumption of the mill to 1,000 bales of cotton per month.

A bill will be introduced in the legislature authorizing the town to contract with the Georgia, Carolina and Northern Railroad Company (office, Athens,) for the erection of its machine shops in Abbeville, S. C.

It is stated that brick works, machine shops, spoke factory, canning factory and ice factory will be established at Frederick Md. The Frederick City Manufacturing and Development Company can give information.

The Gennett Air-brake Company, of Chicago, has been incorporated, for the manufacture of air brakes; capital stock, $800,000; incorporators, David Wallach, Philip Opper, Isaac Neuberger and Moses L. Rothchild.

The Canonsburg Iron and Steel Company, Canonsburg, Pa., has decided to enlarge the capacity of its works one-third. This step has been deemed necessary, owing to the increased demand which exists for black plate.

On December 3rd a license of incorporation was issued to the Plating, Polishing and Manufacturing Company, Geneva, N. Y., to carry on the business of metal plating, etc. The authorized capital of the company is $1,000.

R. E. Sandford, of Columbus, O., is reported as having purchased the iron foundry and machine shops of the Laredo Foundry and Machine Company at Laredo, Texas, and will put in new machinery and operate the same.

The International Aluminum Company has been incorporated at Chicago, Ill., to manufacture and sell aluminum. The incorporators are Franklin Babcock, William A. Pfuff and Charles A. Wood, and the authorized capital $10,000.

At Piedmont, W. Va., negotiations are now pending between the Twin Towns Manufacturing Company, and Stutzman & Katzmaier, of Williamsport, Pa., for the removal to Piedmont of the machine shop and iron foundry of the last mentioned firm.

The Iron City Milling Company, of Pittsburg, Pa., has been incorporated, with a capital of $50,000. The directors are David Whitmyer, J. G. Claus, J. M. Smith and C. F. Klopfer, Pittsburgh; R. D. Elwood, of Verona, and George Whitmyer, of Oakmont.

The Corey Car Company, manufacturers of mining cars, have made arrangements to build works at Waukegan, Ill., and will break ground when building can be safely begun. The plant will be quite large, as the company expect to employ some 700 men.

A $30,000 stock company is reported as incorporated, to establish iron works at Jasper, Tenn., a $10,000 planing-mill is reported as to be established, and negotiations are pending for the establishment of a hub and spoke factory. The Jasper City Land and Mining Company can give information.

We have received from the Lacy Manufacturing Company, Los Angeles, Cal., a well prepared and handsomely illustrated catalogue of riveted sheet steel, well and water pipe fittings, tanks, etc. The catalogue is one from which engineers can obtain information, and is well bound for preservation.

A corporation, to be known as the American Electric Machinery Company, has been organized at Portland, Me., with a capital stock of $10,000, for the purpose of manufacturing machinery. The officers are: President, Daniel W. Scribney, of Portland, Me.; treasurer, S. Lewis Moody, of Saco, Me.

East St. Louis, Ill., has another new industry—the Cherry Valley Mining and Smelting Company. Its aim is to develop mines and property, and to build and operate mills and reduction works. The capital is $1,500,000. Alvis Thomas, Charles D. Hoffman, and John B. Whitehead are the incorporators.

The Superior Manufacturing Company, of Springfield, Ohio, and Chamberlain & Riders, of Hudson, Mich., are reported as investigating with a view of locating their agricultural implement factories in Glasgow, Va. If these companies decide to locate in Glasgow, they will consolidate and operate under one management.

The Racine Malleable and Gray Iron Company, of Racine, Wis., will move to South Superior, Wis. The company has increased its capital to $150,000, and will erect five buildings at South Superior, constructed of brick and iron. Letter presses and all kinds of carpenter's tools will be manufactured, and 400 men will be employed.

Prominent capitalists of Milwaukee and the East are reported to have purchased a large tract of land near Milwaukee, Wis., upon which it is proposed to erect large car works to give employment to 1,000 men. The proprietors of the Milwaukee Car Wheel Works are said to be interested. Work on the buildings is to begin soon.

The Black Falls Spool and Bobbin Company, of Montgomery, Vt., are making preparations to do the largest business in the United States of its kind. They own 2,500 acres of heavily timbered land, situated in a sloping valley right at their doors. It is estimated that on these lands there is wood enough for $1,500,000 worth of bobbins, besides the soft spruce wood which they manufacture into clapboards. A large farm has been cleared up and good buildings erected with a capacity for running 250 hands.—*Vermont Phœnix.*

The Toledo Machine Tool Works, Toledo, O., formerly owned and operated by G. H. Danielson, has been changed into an incorporated company with $30,000 capital stock, under the style of the Toledo Machine and Tool Company. Mr. Danielson will continue with the new company as manager of the business, which, as heretofore, will be the manufacture of presses, dies, special machinery and all kinds of sheet metal tools. The names of the incorporators of the company are, G. H. Danielson, E. A. Phillips, E. P. Breckenridge, E. A. Edwards and J. D. Riggs.

The F. T. Aschman Steel Casting Company, a new concern at Sharon, Pa., have bought the works of the Evans Iron Company, in Sharon, and are remodeling it to serve as a steel foundry. Various alterations, additions and improvements are being made. The pits for the foundations of the furnace and gas producers are now ready, and work on the latter will soon be commenced. The plant will be ready for operations early in January next, and will turn out steel castings of all kinds for railroads, steamships, rolling mills, etc. About 40 hands will be employed at the start. F. T. Aschman is general manager.

The Springfield Emery Wheel Manufacturing Company, of Bridgeport, Conn., who a short time ago found themselves in financial embarrassment, and under the necessity of calling a meeting of their creditors, have been granted the extension of time asked for in which to pay their debts. This guarantees the continuance of the business. The management will be changed somewhat, although the invaluable services of the founders of the business will be retained. The works have not lost a day during the trouble, but, owing to circumstances, only about a two-thirds force was employed. The works will now be pushed to their fullest capacity, and with the large line manufactured, and a good supply of orders on hand, the outlook is very promising.

The new paper and pulp mill of Madison, Me., is now fast approaching completion. The buildings are designed and built by the Berlin Iron Bridge Company, of East Berlin, Conn., and are constructed entirely of brick and iron. The machine shop will be 72 feet wide by 185 feet long and one story high, the wash-room will be 74 feet wide by 182 feet long and two stories high, the digester building will be 62 feet wide by 221 feet long and three stories high, the wheel house will be 73 feet wide by 78 feet long and two stories high. All the main supporting members of the building are of iron, and between the iron supports are light brick walls; some of the floors are made of concrete, and others of wood. When completed the building will be one of the largest and best constructed pulp-mills in the world.

Railroad Combinations.

The owners of railroads in this country seem to be between two fires, one or the other of which seems likely to do some scorching before they escape.

On the one hand there is the cut-throat competition between the different lines by which rates for through business are undoubtedly often carried far below the point at which there is any profit in the business, and this loss, if it cannot be made up on local business, must be borne by the stockholders, while, if it is made up on local business, the people who pay local rates think they have just cause of complaint, as who shall deny that they have?

Several attempts have been made within the past few years to avoid this fire by "agreements" which, in effect, are combinations, and as soon as one is formed that seems likely to avail anything, some of the more outspoken newspapers, and those which probably come nearest voicing the sentiments of the people, point to the danger of the concentration of such vast power as this gives in the hands of a single small body of men, within which is included no representative of the people's interests, and thus the heat of the other fire is felt.

There can be no doubt that much of the competition between the roads now going on is ruinous, and is not only so for the roads, but is, in the end, prejudicial to the best interests of the people. But, on the other hand, it is well recognized that the power of a single great railroad corporation is very great, and, when unrestricted by any outside influence, this power becomes a menace. The combination of twenty such railroads, if anything like a strong combination is effected, is much more than twenty times as dangerous, and that this fact is generally recognized is evidenced by the fact that no sooner is such a combination formed than there is talk of the necessity for the government taking hold of the railroad business.

Whether it will ever be necessary or advisable for the government to run railroads in this country or not, we think no one can at present say, but that it will be necessary for the government to exercise considerable control over them, we think is daily becoming more apparent. Wherever a business is by nature a monopoly, and especially where the power to carry on that business is derived directly from a charter granted by the people, some degree of control by them would seem to be fair, and is being proven to be necessary.

When the presidents of railroads meet and form combinations for the purpose of keeping up rates, hoping thereby to escape one horn of the dilemma, they run the risk of impalement on the other by strengthening the position of those who maintain that the power likely to be wielded will be abused, and is dangerous.

It is undeniable that it is better for all concerned that the roads should manage their own affairs without interference, so long as a reasonable regard for the rights of the people is shown, and we believe there will never be serious interference except as a matter of self-defense. But when it is made apparent that there is no way of escaping the evils of the unfair competition which has been going on in some cases, except by the formation of powerful combinations, then it may be set down that a change of some kind is imminent, and that the people must protect themselves from the roads, and the roads from each other.

Cold Saws in Shipbuilding.

Another machine of recent introduction is what is called a "cold saw." This is simply a species of circular saw of fine steel, tempered somewhat hard, and about ¼ inch in thickness at the periphery; it is ground slightly thinner at its center to clear itself easily in a deep cut. It is made to revolve at a slow speed while it cuts through bars or plates of any section. This machine is almost indispensable where neat and accurate fitting is demanded. There is not usually much neatness in the ironwork of a ship, and therefore shipbuilders have not yet so largely availed themselves of the help offered by this tool as some other workers in iron and steel, such as bridge builders. A few shipbuilders have found how it might be usefully employed, and doubtless it will, ere long, come into general service in all shipyards. It may be said that angle and other sections can be cut more rapidly by the shearing machine, or by a hot saw (so called because it can only cut metal that has been heated to redness). True enough, but such bars cannot be cut with that accuracy to line and smoothness of finish which the cold saw gives. When a bar of angle iron has to be cut askew, for instance, usually it is first roughly cut off by the shears, and then it must be heated in a smith's fire, and, while hot, cut to the exact bevel required by warm chisels, and dressed by hammering. Or by means of a "hot" saw it may be cut pretty accurately to line while hot. But in both cases a rough end is formed, and the expense of so heating and dressing, or sawing hot, must be considerably greater than if it had been done at once by the cold saw. For rough work that requires nothing better than the unfinished ends left by shearing, the saw is not necessary, and cannot thus compare with shears for economy. It is slow in its action, for it advances with its cut at the rate of about one inch per minute; but it is quick and economical compared with heating in a smith's fire and the delay of cutting and trimming by hand tools. And there are certain sections, such as Z and channel sections, which shears are hardly ever formed to cut. These, as well as round and square bars of large section, can be cut beautifully by the cold saw. The bar has simply to be placed on the table, so that its line of severance lies

truly in the path of the saw. It is easily held fast by bolts in the slots on surface of table, and then the saw advances through the work. This machine differs from an ordinary circular saw in this respect, that it is not the work that moves up to the saw, but the saw is made to travel along the tabie through the work. It is driven by a worm-wheel and screw of some 4 feet or 5 feet in length, along which it can be moved easily by hand-screw gear or by self-acting feed gear. This feed gear can be quickly and simply detached when it is desired to run back the saw quickly by hand. These machines are made by various tool makers, without much difference in form. The large screw ought to be of steel and very smoothly chased, and the worm-wheel of some specially hard bronze composition. Band saws have also been used for cutting metals cold, but these are expensive, and can scarcely yet be said to be shipyard tools. Their place is more strictly in the engineering department. —*Engineering.*

Thermostatic Damper Regulator.

The accompanying illustration shows a damper regulator which has been recently brought out by the Curtis Regulator Co., of Boston.

It is of that class of regulators which control the opening of the damper of the varying pressure under a diaphragm, the pressure in this case being controlled by the contraction and expansion of a copper rod which operates the only valve there is about the device.

In operation, when the desired temperature of the circulating medium (which may be either water or steam) is reached, the hand-wheel shown is screwed in until the lever under it forces the valve above off its seat, allowing cold water to flow in under the diaphragm, and by means of the lever and usual connections closes the damper. Now should the temperature of the boiler fall, the brass rod is contracted, allowing the lever to give way to the force of the spring and closing the valve. For the low pressure at which this regulator is used, temperature, it is claimed, can be controlled by it within 3° or ½ pound pressure.

The World's Columbian Exposition Assured.

The President has issued his proclamation which assures the holding of the exposition at Chicago. The pertinent part of this proclamation is as follows:

Whereas, satisfactory proof has been presented to me that provision has been made for adequate grounds and buildings for the uses of the World's Columbian Exposition, and that a sum not less than $10,000,000, to be used and expended for the purposes of said exposition, has been provided in accordance with the conditions and requirements of Section 10 of an act entitled "An Act to provide for celebrating the four hundredth anniversary of the discovery of America by Christopher Columbus, by holding an international exhibition of arts, industries, manufactures, and the products of the soil, mine and sea, in the city of Chicago, in the State of Illinois," approved April 25, 1890:

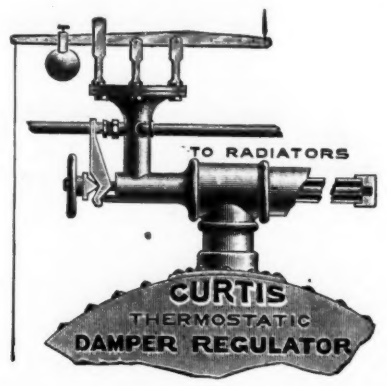
Now, therefore, I, Benjamin Harrison, President of the United States, by virtue of the authority vested in me by said act, do hereby declare and proclaim that such International Exhibition will be opened on the first day of May, in the year eighteen hundred and ninety-three, in the city of Chicago, in the State of Illinois, and will not be closed before the last Thursday in October of the same year. And in the name of the Government and of the people of the United States, I do hereby invite all the nations of the earth to take part in the commemoration of an event that is pre-eminent in human history and of lasting interest to mankind, by appointing representatives thereto and sending such exhibits to the World's Columbian Exposition as will most fitly and fully illustrate their resources, their industries, and their progress in civilization.

We have received from the Niles Tool Works an elegant cane, together with an artistic souvenir in the shape of a little book, containing, along with the words presenting the cane, other interesting reading matter. It is a novel and useful Christmas reminder, and appreciated accordingly.

The daily press continues to record a fearful number of railroad accidents. The railroad companies ought to be looked after.

Railroad Freight Charges.

This is by no means the only country in which differences between the public and railroads exist. In England there is a persistent quarrel between shippers and the railway companies as to freight charges, and the comparatively low rates prevailing in the United States are made to do duty in these quarrels. Freight is carried here at much lower cost to the shipper than it carried in England, and the Board of Trade



there has been persistently importuned in the premises. Commenting upon the matter, our English contemporary, *Industries*, says:

"There are three circumstances that powerfully contribute to enable American railways to charge much lower rates of freight than the railways of Great Britain. These may be started in the following order: 1. The much greater first cost of British lines, and the consequent necessity of a higher net mileage income to meet the interest on capital expenditure. 2. The much heavier gradients that are generally met with on English and Scotch railways. 3. The heavier train loads that the American locomotives are able to carry, as a result of their more level roads. 4. The longer average haul on American railways. It is hardly necessary to go into these several matters at length, since they are sufficiently well understood by nearly all railway authorities. The Board of Trade has been urged to encourage the adoption of heavier train and truck loads on English lines, but the railway authorities declare that the English system of working is specially well adapted to the circumstances of English lines—to short hauls, to frequently occurring steep gradients, and to the general character of the traffic—and it may be presumed that English railway managers are well acquainted with their own special needs.

"The influence of the length of haul is one that tells very much in favor of American, and against English lines. The average haul in England has never been accurately ascertained, but in all cases the traffic is carried in the United States a much longer distance than in England. The average haul on British railways has been computed at 35 miles. It is certainly not much more than this, and it may be somewhat less. But on the railways of the United States the ascertained average haul is not less than 112 miles, or, say, three times what it is on the railways of our own country. This, of course, means that on British railways there is about three times as much handling of traffic as on the railways of the United States, and this fact alone would largely account for the lower rates on American lines. There are, however, individual States in which the average length of haul is far from equal to that just given, and where, nevertheless, the rates are very low. Such, for instance, is the case in the State of Pennsylvania, where the average ton mile rate is not more than 59 miles, and in the whole group of the Middle States, where the average is under 90 miles, although, as we have seen, the average ton mile rate there is under the average of the ton mile rate in the United States as a whole.

"An appeal has also been made from the railways of Great Britain to the railways of the Continent, and judgment has gone against the British railways on every point except that of efficiency. There cannot be a doubt that the British railways are characterized by a high degree of efficiency, and this is some compensation for high charges; but it can hardly be held to make amends for exorbitant rates in regard to traffic of low value, such as that of minerals and crude materials generally. There is an impression on the part of the Board of Trade that a lower range of rates would ultimately recompense the railway companies by the consequent increase of traffic, and, if we remember what has been done in the United States and elsewhere, this would appear to be an experiment well worth trying."

Chilled Castings.

BY ALEX. CAIRNS.

In your issue of November 13th I note the question asked by your correspondent, in regard to a suitable mixture for a die 3″x14″x20.″ He further states that it has been impossible for them to turn out a casting, the chilled side of which could not be indented with a hammer, which, by the way, I think he will always find the case if he uses car-wheel iron alone. Contrary to the general belief, the face, or tread of a car wheel can be indented very easily with a hammer, and can even be filed with the sharp corner of a finishing file. The class of metal used in car wheels is considered very hard when used in light work, and very desirable for heavy machinery. Hence, had your casting been ½″ thick, instead of 3″, you would find that it would be next to impossible to indent it with a hammer, and, should you succeed in doing so, without breaking the casting, you would find, on examining the indentation with a glass, that it resembled a crush, and not the malleable indentation which was the case with your three-inch die. It is invariably the rule that where two castings cast of the same metal, and on chills, the one thin and the other thick, the heavy casting will not show nearly the degree of hardness that the thin one does, which is caused by the annealing influence (in the heavy casting) of the body of iron above the chilled face.

Having had considerable experience in casting dies for drop hammers, steam hammers, etc., I will give what I think is the best and cheapest way to turn out serviceable dies. We will suppose the die is cast on a chill, although in this case a chill is not necessary, and the casting of the dimensions named above. On being ready to ram up the cope part of mold, you will place a runner at each end and one at the side, and a shrink-head in the middle on top. Next procure a crucible, and if you have no brass furnace brick up a blacksmith's forge with common red brick, about 18″ high. Select the hardest coke you can find for the bed; having the fire started, fill the crucible with scrap steel, and, if you cannot find enough of that, make up the weight with wrought borings, which, however, will not make as good a face as selected steel scrap, but will answer for all practical purposes where there is not too great a strain on the die.

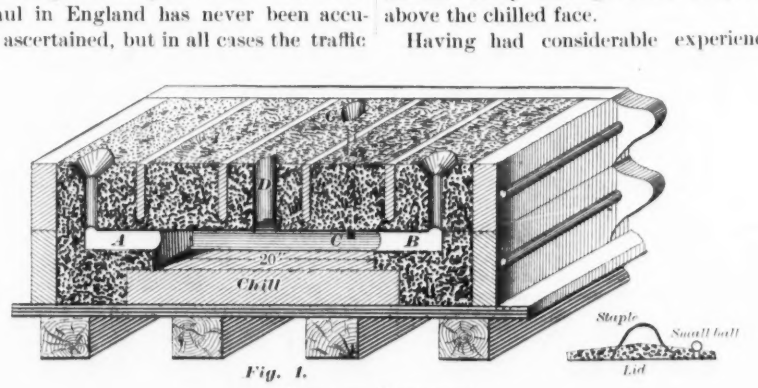


Fig. 1.

CHILLED CASTINGS.

Having filled the crucible, put it on the bed, put coke around it, and put on the blast. Get some new molding sand and clay—equal parts—and mix with a handful of flour. Make a mud cake out of this, and bed an iron staple in the middle, as in cut. Punch a ⅜″ hole through the cake, and make a small mud ball, 1¼″ in diameter, to cover this ⅜″ hole, and place the cake on the crucible and press the edges down all around. As the quality of the steel depends, in a great measure, on its being kept from the air when melted, the use of cover, hole and ball will be obvious.

In Fig. 1 you will see the arrangement of gates, and also the use the side gate is put to. If you want a 1¼″ steel face on the die, cut the side gate 1¼″ from bottom of mold. When your steel is melted and ready, which you can observe by rolling off the ball on cover and sticking a ⅛″ rod down in the metal, bring up a ladle of iron, and pour steel in at *A*, watch it up at *C*, and when it enters *C* call a halt; look down the shrink-head at *D*, and watch the lowering temperature of the steel. As it is not necessary to fix any temperature, the iron can be poured in in from one to two minutes after the steel, but not immediately after, for the iron is liable to cut too deeply into the steel. On the casting being cold you will find that the hardness of the face will depend on the quality of steel used. Good tool steel, properly melted, will admit of being worked and tempered, while a promiscuous lot of steel and wrought scrap will turn out a face hard or soft, according to the proportions of each, and in some cases so hard that annealing has little or no effect upon it. The soft iron poured in on top of the steel admits of being worked, and the face, I think, will be found hard enough for any purpose.

Should you not wish to put a steel face on the die, the same mode of pouring will enable you to put spiegle No. 4 charcoal or coke, or, in fact, any grade of iron you desire on the face by pouring in a certain amount of one metal in one gate, the balance of mold being filled up with the other metal.

There is still another way brought to mind that is, perhaps, as cheap as any. Lap from the cupola a ladle of hot iron, and introduce steel turnings in the proportion of one of steel to four, five or six of iron. Pour this mixture in at *A*, Fig. 1. When slightly cool pour in soft iron on top of it. This latter I have never used, and think it is somewhat unreliable, but might produce fair results. But for good hard service I don't think the steel-faced die can be beat.

I might state for the information of your correspondent that water circulating through a car-wheel chill is of no use whatsoever unless the chill is a contracting one, the idea being (after expanding the chill by circulating steam through it and casting) to make the chill contract, and follow up the shrinkage of the casting by circulating cold water through it; the advantage gained, if any, is slight, owing to the inability of the chill to contract quickly enough.

Messrs. Vickers, Sons & Co., River Don Works, according to the London *Engineer*, have decided to put down another forging press, which, it is believed, will be the most powerful in the world. The weight of the largest piece of the press as cast was eighty-five tons. The heaviest part of the work will be done at the works, the ordinary plant of the establishment being amply sufficient for the purpose. Outside assistance has been sought for the lighter parts of the work in pieces up to about fifty tons. Mr. Edward Reynolds, the engineer and one of the directors, states that it has only been a question of expediting the work with the least interference with external orders. Some of the engineering parts will be done by a Glasgow house, who will fit up a shop at Sheffield for the purpose and send their men there.

It is said that 60,000 workpeople of both sexes are out of employment in Berlin.

How competition sometimes works may be seen in the fire departments of our large cities. Gradual improvement has worked its way until the time required for an engine to get to pouring its streams on a fire is astonishingly small. Away down in the few seconds suffices to get the engine, properly manned, on the street. This comes from the training of men for the service, a similar training of horses, and the mechanical inventions that enable the harnessing of horses to the engine with scarcely an apparent lapse of time. And experience has enabled the starting of a fierce fire in a few seconds, increasing the heat of the already hot water, raising steam while one is thinking, in a boiler made and improved especially with that end in view. Competition is responsible for a good deal of this advance. Engine companies never relish being beaten at a fire—they didn't in the days of the old hand-engine—and cities like to have the best record in such matters. So while the demand for quick work is apparent, competition is responsible for a good deal of it.

Professor Scheiller, an Austrian, has invented a machine for producing artificial smoke on a battle-field, to counteract the introduction of smokeless powder. A military critic, in the *Journal des Debats*, says: "The much-abused smoke has the advantage of concealing from the combatant the carnage going on all about him; it isolates him, and shrouds from his sight the wounded and the dead. A man fancies he is sheltered when he finds himself surrounded by a thick cloud. This is part and parcel of the same instinctive feeling which leads one to duck one's head at the whiz of a bullet, and impels the novice who forms the bulk of our infantry to blaze away his ammunition to ease his nerves and acquire a kind of intoxication from the noise and the smell of the powder."—*Army and Navy Journal.*

While the English people were much slower in adopting electric lighting than were the people of this country, they appear to be going now with a rush. In a large number of towns it is proposed that the town shall lay down its own plant. It is believed that business in electrical machinery as well as in engines and boilers will be most favorably affected during the next few years by the progress in electric lighting.

A short time ago we spoke of the formation of two combinations of manufacturers (harvesting machinery and threshing machines), in which the farmers would probably be especially interested. Now there are two more—a barbed wire trust and a combination of the makers of vehicle wheels.

A correspondent—an apprentice, we infer—writes us giving his reasons why apprentices do not serve their time out in machine shops. He thinks they are kept too long chipping castings and cutting bolts.

It is thought that it will be only a short time before a telephone will be in practical operation between London and Paris, the cables crossing the channel from Kent to San Gatte.

In the year 1889 the whole Russian railway system carried 41,569,000 passengers and 61,843,470 tons of freight on 17,692 miles of railway, earning $8,200 per mile.

It is said that in England exhaust injectors are made to work against a pressure of 140. We believe the manufacturers are Holden & Brooke, of Salford.

Machinists' Supplies and Iron.

NEW YORK, December 27, 1890.

Iron—American Pig—The business transacted has been of the narrowest proportions, consumers for the most part confining their purchases to actual current needs. The general hesitancy in regard to the placing of orders for next year's work has had a decided effect upon the demand for finished iron, and this, of course, has its influence at the prime sources of supply. There is considerable pressure to sell in some quarters, and most brands can be purchased at concessions.

We quote No. 1 Foundry, standard Northern brands, $16.50 to $17.50; No. 2, $16 to $16.50; Gray Forge, $15 to $15.50; Southern brands No. 1 Foundry, $16.25 to $16.75; No. 2, $15.75 to $16; No. 3, $14.25 to $14.50.

Scotch Pig—The situation has undergone no change of importance, and the business transacted has been remarkably light.

We quote Coltness, $24.50; Daimellington, $22 to $22.50, and Eglinton, $20.50.

Copper—The market has been remarkably dull, and very much unsettled. Consumers seem to have no disposition to buy beyond current needs, except at prices which sellers are not willing to concede. Quotations are nominal. The highest offers for Lake have been 14c., though, so far as known, none has been offered lower than 15c.

Lead—No change of importance has taken place during the week. The business transacted has been light, purchasers being almost entirely consumers who buy to supply current wants only. Values are somewhat nominal, but are at about 4c. to 4.10c.

Spelter—The market has continued to rule quiet, and the demand is light, though prices are steadily maintained.

We quote ordinary brands of Western at 5.90c. to 6c.; choice, 6⅛c to 6¼c.; refined, 7¾c. to 8c.; Silesian, 7⅜c. to 7½c.

Tin—Trade has been quiet, and prices are not strictly maintained, considerable concessions being obtainable. Jobbing prices are 20¼c. to 20⅝c., but there is little buying except to supply current needs.

Lard Oil—There has been a moderate demand for Prime, which has sold at 48½c. to 49½c.

✲WANTED✲

"Situation and Help" Advertisements only inserted under this head. Rate 30 cents a line for each insertion. About seven words make a line. Copy should be sent to reach us not later than Saturday morning for the ensuing week's issue.

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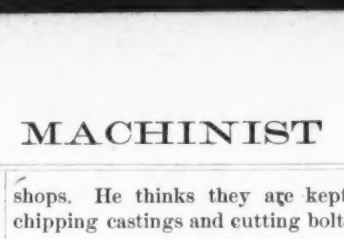

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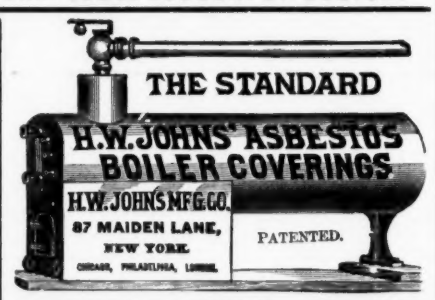

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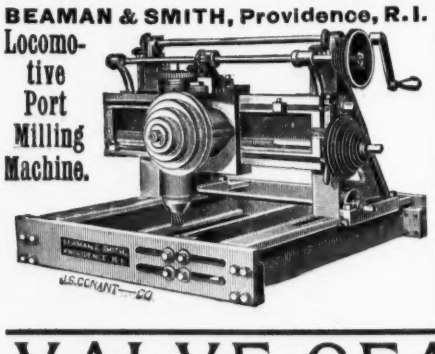

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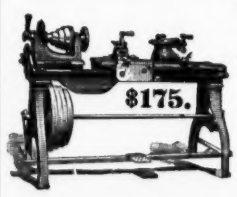

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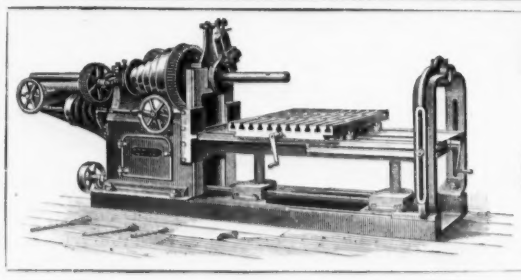

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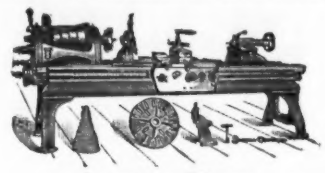

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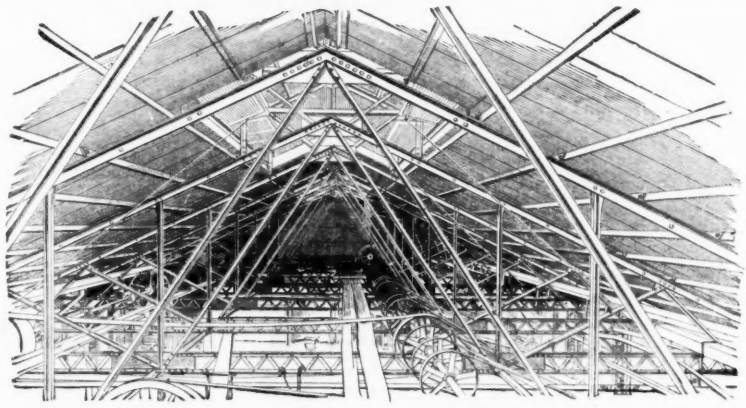

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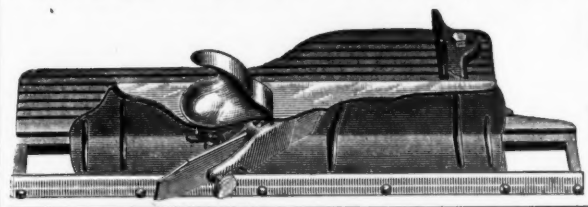

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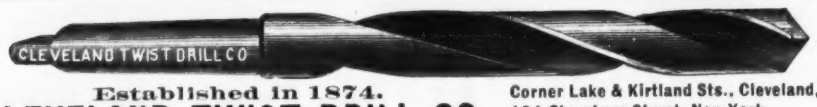

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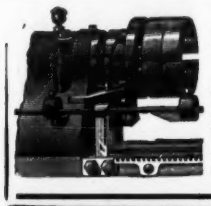
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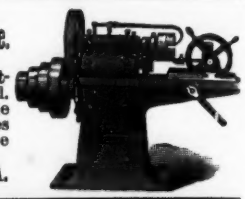

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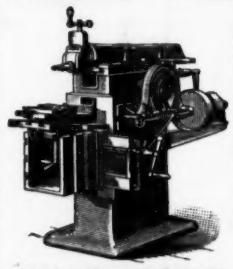
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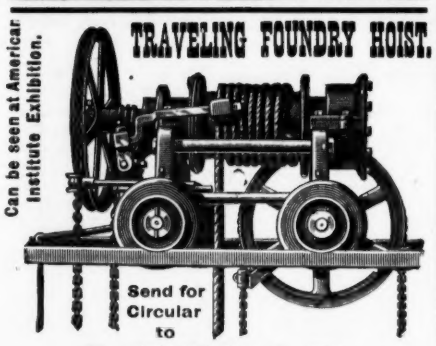
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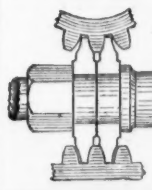
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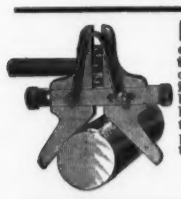
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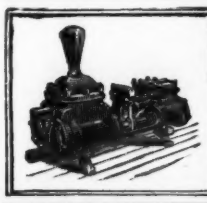
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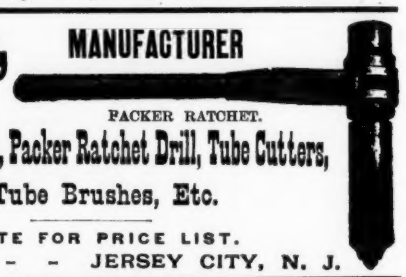
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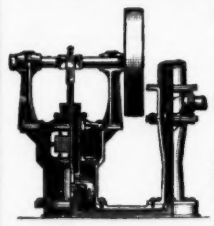
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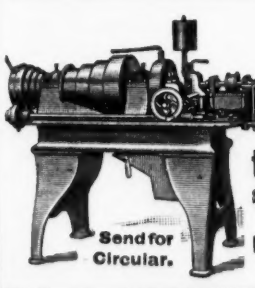
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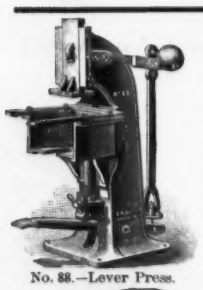
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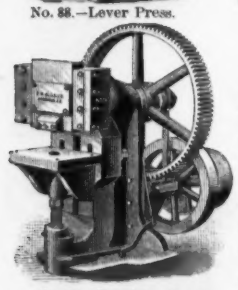
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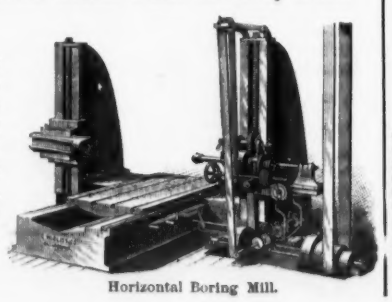
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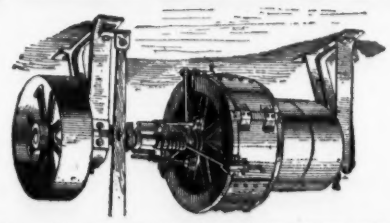
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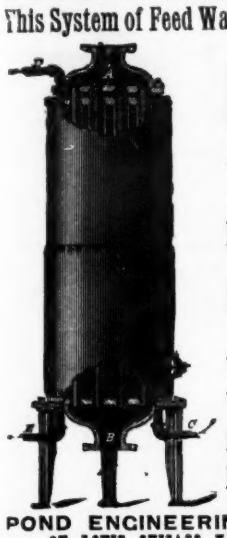

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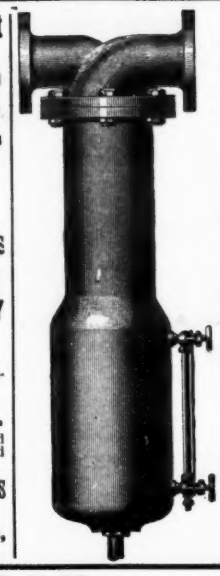

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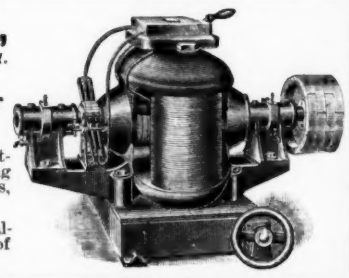

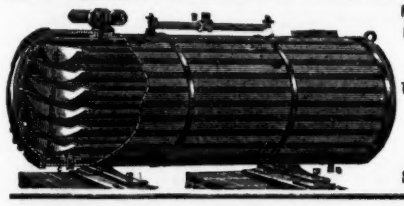

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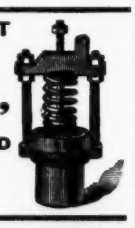

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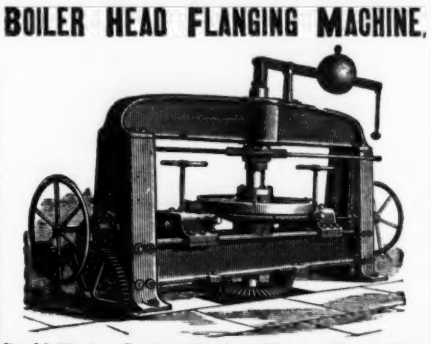

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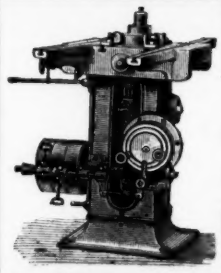

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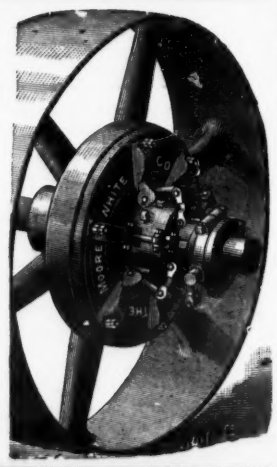

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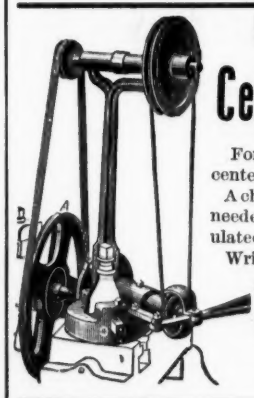

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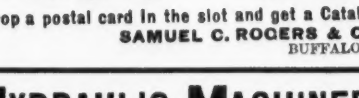

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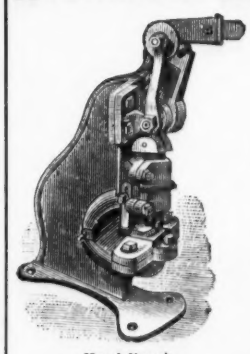

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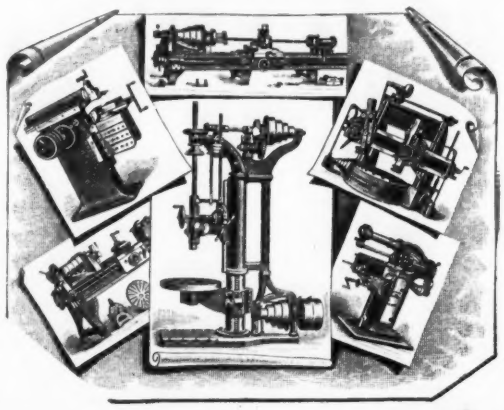

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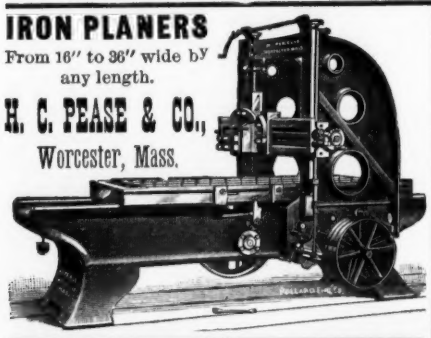

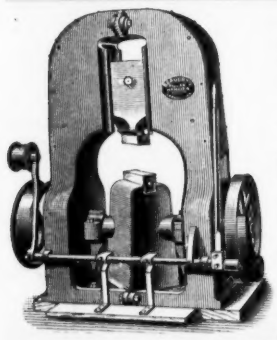

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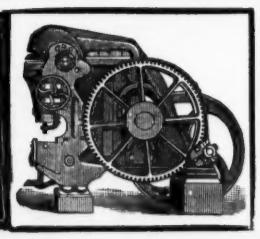

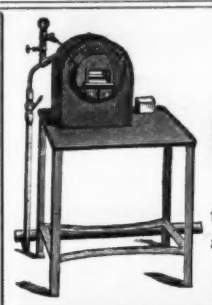

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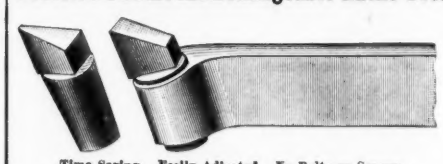

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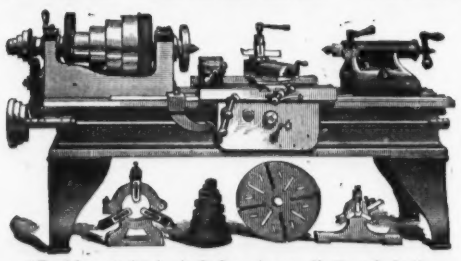

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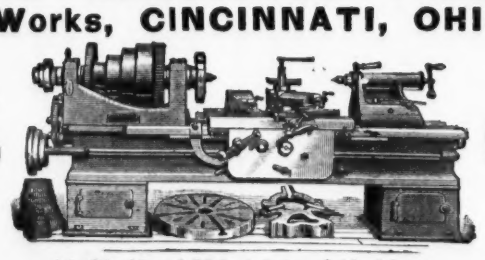

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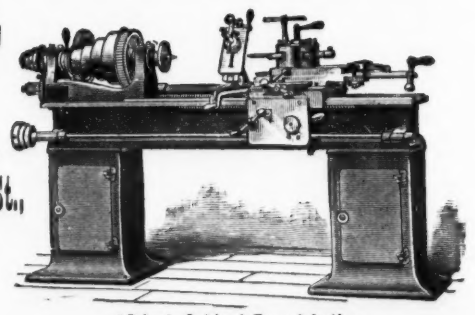

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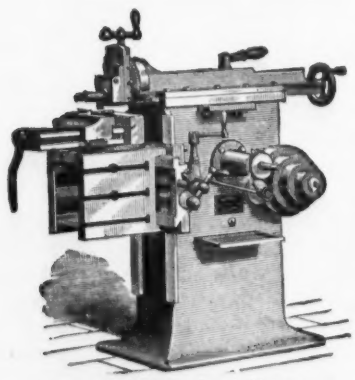

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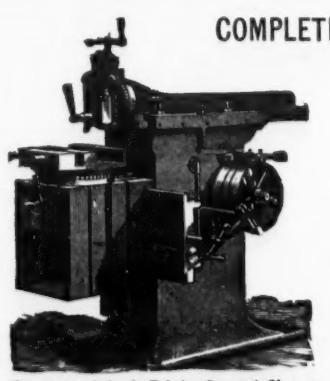

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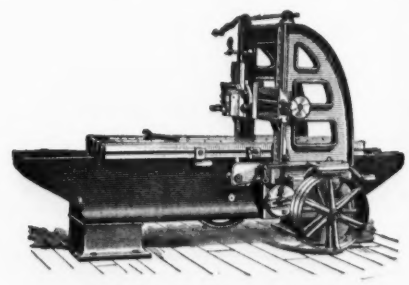

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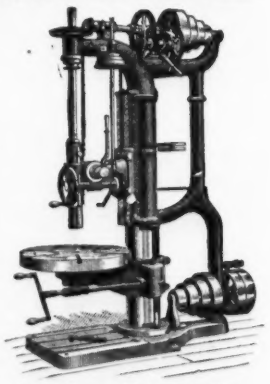

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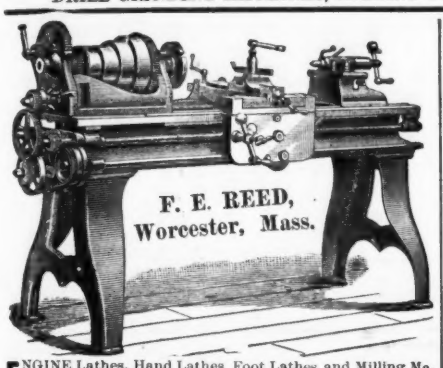

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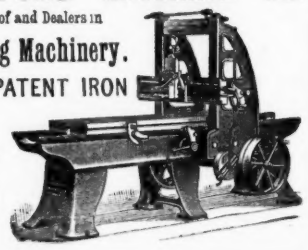

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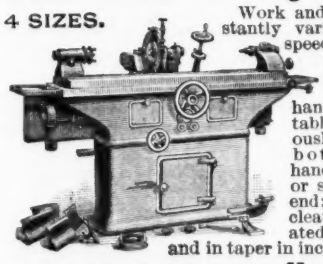

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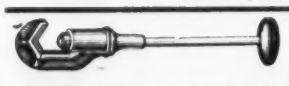

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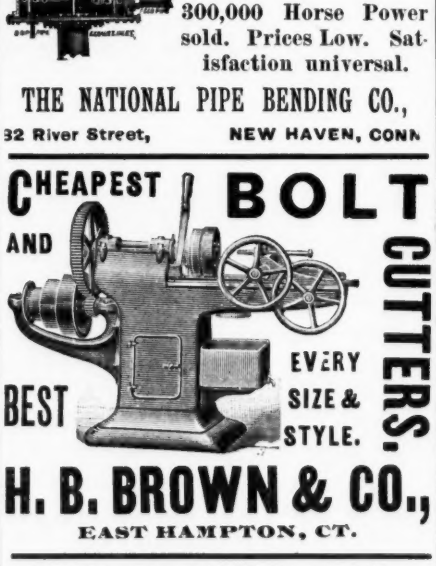

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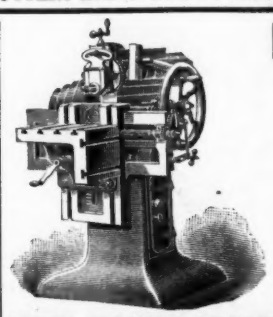

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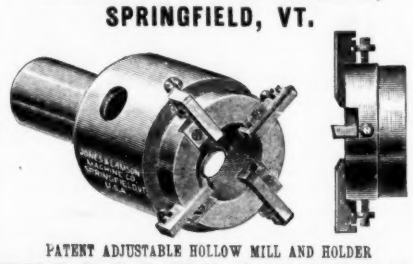

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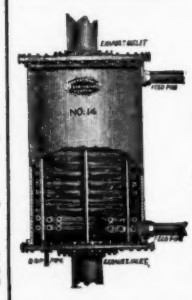

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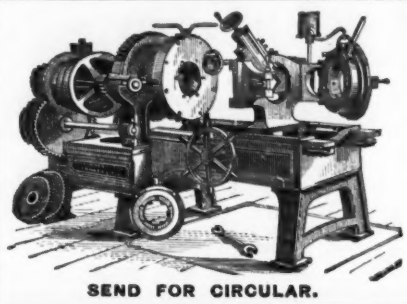

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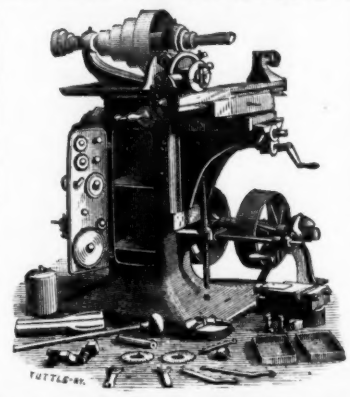

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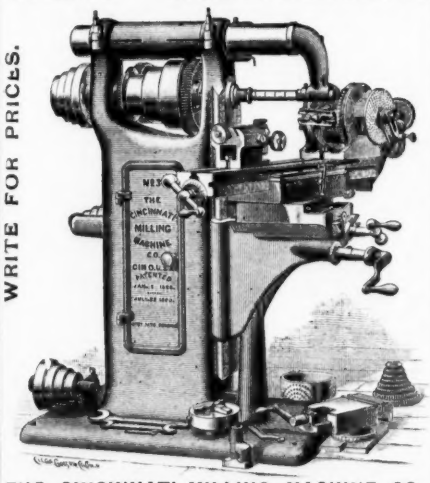

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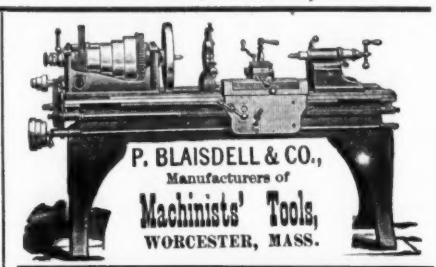

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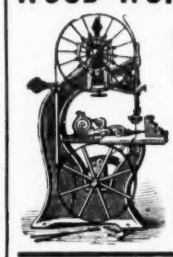

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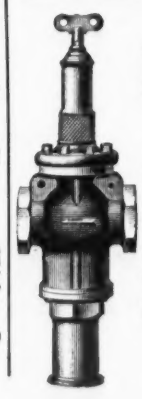

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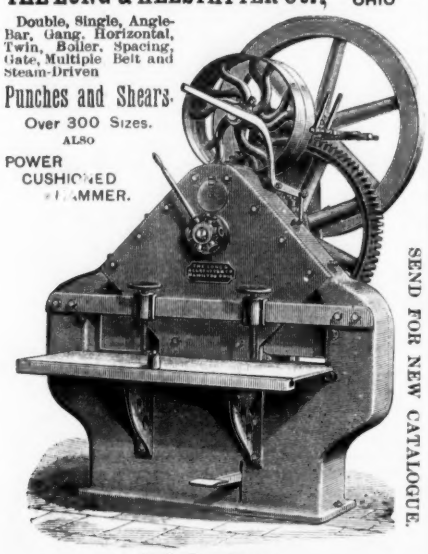
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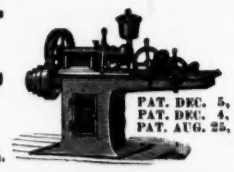
PAT. DEC. 5, 1882.
PAT. DEC. 4, 1883.
PAT. AUG. 25, 1885.

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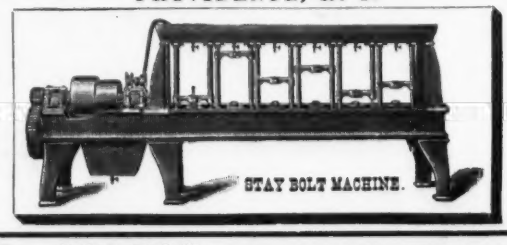
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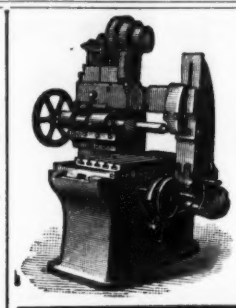

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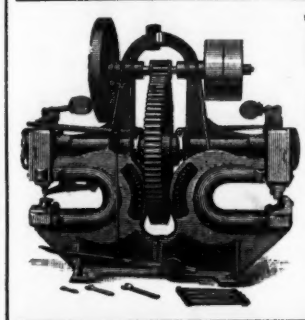

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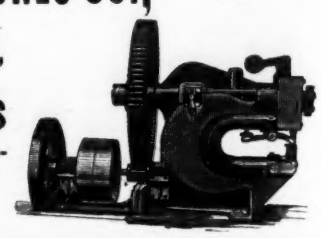

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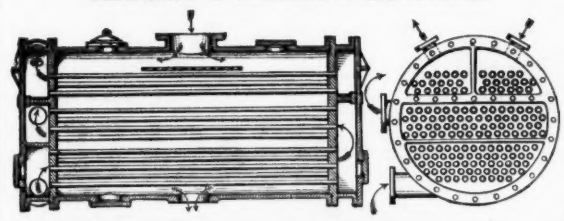

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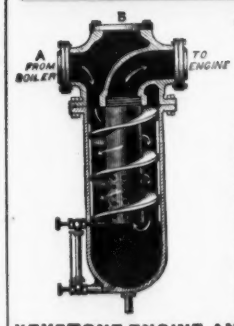

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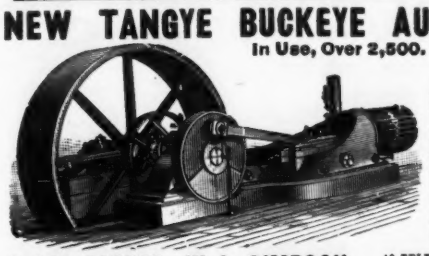

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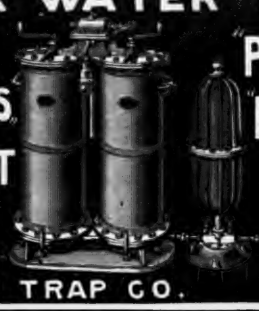

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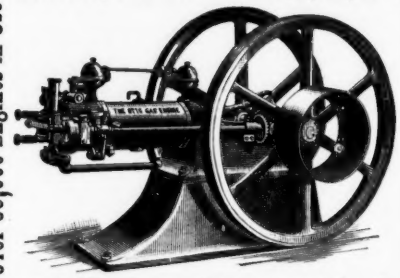

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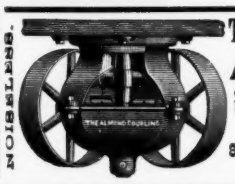

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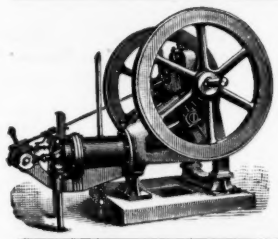

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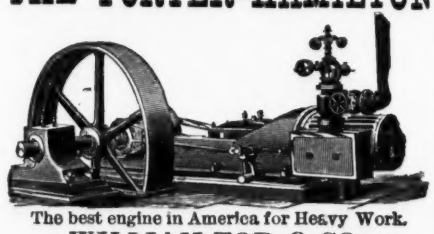

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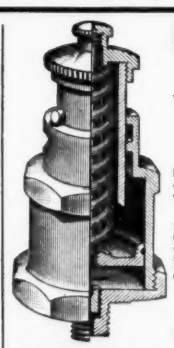

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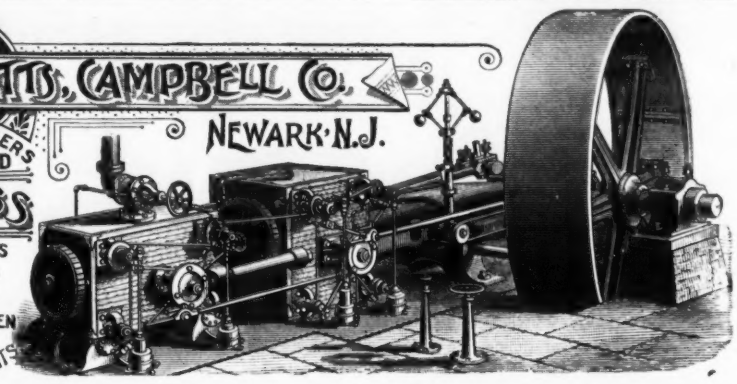

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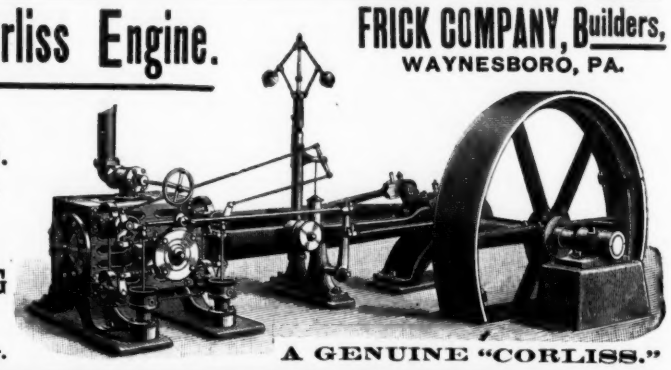

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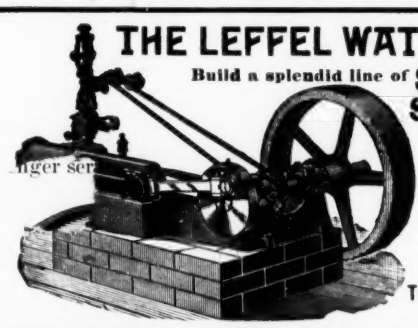

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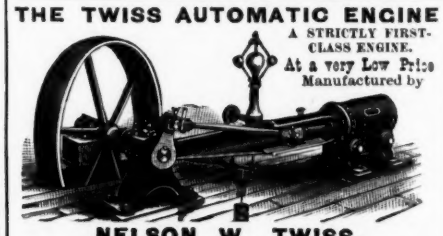

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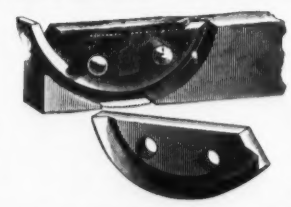

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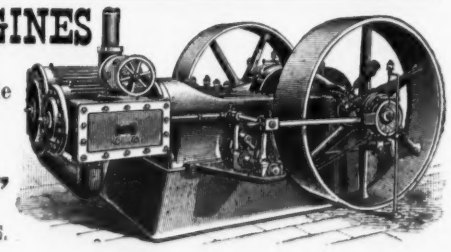

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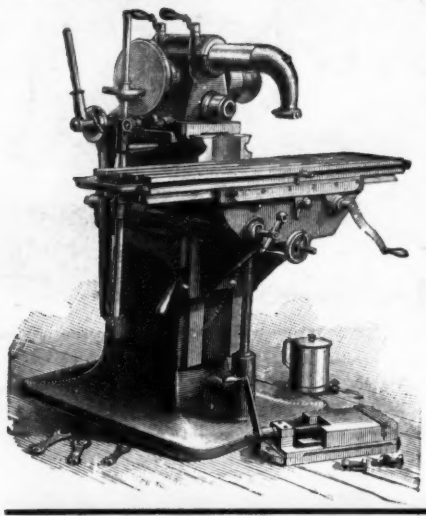

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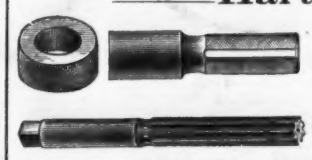

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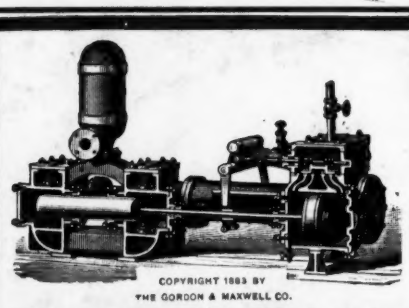

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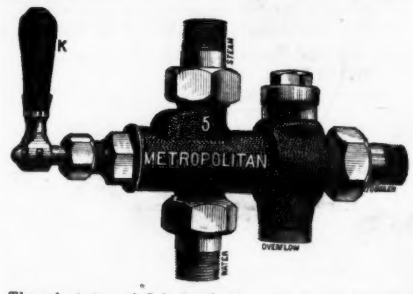

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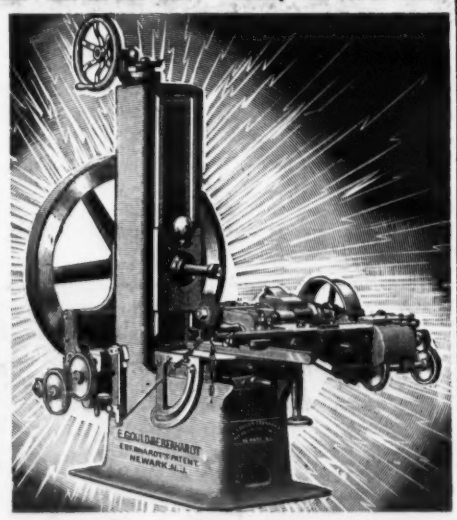

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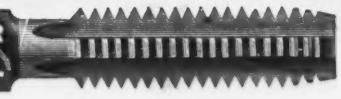

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